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PART IV:

FEDERAL COMMUNICATIONS COMMISSION

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INTERNATIONAL TELECOMMUNICATION UNION, GENERAL WORLD ADMINISTRATIVE RADIO CONFERENCE PREPARATION

Revision of International Radio Regulations

FEDERAL COMMUNICATIONS COMMISSION

[Docket No. 20271; FCC 76-1099]

INTERNATIONAL TELECOMMUNICATION UNION, GENERAL WORLD ADMINISTRATIVE RADIO CONFERENCE PREPARATION

Revision of International Radio Regulations

Adopted: November 24, 1976.

Released: December 6, 1976.

Third notice of inquiry. In the matter of an inquiry relative to preparation for a General World Administrative Radio Conference of the International Telecommunication Union to consider Revision of the International Radio Regulations.

1. On September 5, 1975, the Commission adopted a Second Notice of Inquiry in the above entitled matter (FCC 75-990, No. 36758). It was released on September 19, 1975, and appeared in the FEDERAL REGISTER on September 29, 1975 (40 FR 44606). The period for comments and reply comments has passed.

2. The purpose of the Second Notice was to solicit comments "* * * regarding the alignment of the international table with the domestic table," above 40 GHz. Further, comments and supporting technical materials were requested on several points "with respect to the use of small earth terminals in any or all of the space radiocommunications services in the near (1975–1985) and long (1985–2000) term time frame." Finally, we pointed out that in "* * * respect to the 100–1215 MHz band the Commission has received a letter from the Office of Telecommunications Policy advising * * * 'that access to a substantial amount of additional spectrum in that range will be required' "; the matter was raised at that time in order to indicate a need to document civil requirements for use of the spectrum.

3. Comments were filed by Aeronautical Radio, Inc.; Air Transport Association of America; American Broadcasting Companies, Inc.; American Petroleum Institute; American Satellite Corporation; Aircraft Owners and Pilots Association; Association of American Railroads; American Telephone and Telegraph Company; Brown Radio Service and Laboratory; Cities Service Company; Council for UHF Broadcasting; et al; Exxon; General Electric Company; General Telephone and Electronics Service Corporation; Home Box Office, Inc.; Joint Council on Educational Telecommunications; Land Mobile Communications Council; National Association of Business and Education Radio, Inc.; National Cable TV Association, Inc.; Association of Maximum Service Telecasters, Inc.; Motorola, Inc.; RCA; Texas Instruments, Inc.; Transcommunications Corporation; Utilities Telecommunication Council; and Western Union Telegraph Company. Comments were filed late by COMSAT and COMSAT General Corporation. Reply comments were received from American Broadcasting Companies, Inc.; American Telephone and Telegraph Company; American Radio Relay League, Inc.; Associated Public-Safety Communications Officers, Inc.; American Satellite Corporation; Collins Radio Group; Association of Maximum Service Telecasters, Inc.; General Telephone and Electronics Service Corporation; Home Box Office, Inc.; National Cable TV Association, Inc.; and Transcommunications Corporation.

4. Although the comments and reply comments have been considered and will continue to receive attention as this preparatory work advances, they are not summarized herein.

5. The Commission is still studying the subject of small Earth terminals.

6. The 31st Session of the International Telecommunication Union (ITU) Administrative Council, meeting in June 1976, as established the following agenda for the 1979 WARC [1]:

To review, and where necessary, revise the provisions of the Radio Regulations relating to terminology, the allocation of frequency bands and the associated regulations (Articles 1 to 7);

To review and, where necessary, revise the provisions applicable to the coordination, notification and recording of frequency assignments (Articles 9 and 9A) except those articles relating to a single service;

To review and, where necessary, revise the other regulations applicable to services in general (Articles 12 to 20);

To review the report on the activity of the IFRB and revise, where necessary, the provisions relating to its methods of work and internal regulations;

To study the technical aspects of the use of radio-communications for marking, identifying, locating and communicating with the means of medical transport protected under the 1949 Geneva Conventions and any additional instruments of these Conventions;

To consider any Recommendation of the 1977 World Administrative Radio Conference for the Aeronautical Mobile (R) Service on the possible rearrangement of the Radio Regulations and Additional Radio Regulations, and to make such consequential changes as may be necessary to harmonise the revisions of the Radio Regulations since 1959; [2]

To propose to the Administrative Council and to the Plenipotentiary Conference a programme for convening future administrative radio conferences to deal with specific services;

To consider the proposals based on the CCITT studies carried out in accordance with Resolutions Mar2-22 and 23;

To consider the resolutions and recommendations adopted by world administrative radio conferences and to adopt such resolutions and recommendations as may be necessary.

7. The primary purpose of this Notice is to present a proposed International Frequency Allocations Table (Article 5) and to solicit comments thereto. In the development of this table, we have considered the comments and reply comments received in response to the past notices, information available to the Commission, and the reports of the following Service Working Groups (SWG's):

Aviation, Private Microwave, Radio Relay, AM Broadcast, Fixed Satellite, Citizens Band, Private Land Mobile, Amateur, Auxiliary Broadcast, Broadcast Satellite, International Broadcast, Common Carrier Domestic Land Mobile, Television Broadcast, Maritime Mobile, Cable Ancillary, HF Fixed, FM Broadcast, and Radio Astronomy.

In addition, we have also considered the requirements of the Federal Government which have been identified to date. The proposed table is attached as Appendix 1 to this Notice; a justification and rationale for it is provided in the following paragraphs.

8. Although each SWG request may not be identified in the following paragraphs, every attempt has been made to satisfy these requests insofar as practicable. The FCC Public Notice No. 62477 of March 22, 1976, listed the non-government spectrum requirements.

SPECTRUM BETWEEN 10 KHZ AND 4000 KHZ

9. We are proposing little change to the Table of Allocations for this portion of the radio spectrum; approximately 70 percent of the allocations remain the same as contained in the present table. This is because many of the systems utilizing these frequencies are conducting long established, continuing operations. In the following paragraphs we will discuss the proposed changes as well as the needs for spectrum expressed by the various concerned services.

AMATEUR SERVICE

10. The Amateur SWG requested exclusive worldwide allocations between 160 and 190 kHz, 1715 and 2000 kHz, and 3500 and 4000 kHz; we can only partially accommodate these requests because of the requirements of other services operating in this long established portion of the spectrum. We are proposing to add the Amateur Service in the band 160–190 kHz on an exclusive basis. Exclusive allocations are also proposed between 1725 and 1900 kHz in Regions 1 and 3 and between 1750 and 1900 kHz in Region 2; we are additionally proposing an exclusive worldwide allocation in the band 3500–3900 kHz along with a continuation of the present allocations between 3900–4000 kHz.

BROADCAST SERVICES

11. The AM Spectrum SWG requested that the band 535–1605 kHz be continued as allocated to the Broadcasting Service on an exclusive basis, and that neighboring frequencies between 525–535 kHz and 1605–1805 kHz be also allocated in certain regions. As the proposed table reflects, we have added Broadcasting on a primary basis to Regions 2 and 3 at 525–535 kHz; we have continued the exclusive allocation at 535–1605 kHz; and we have added Broadcasting at 1605–1615 kHz on a shared primary basis in Region 2. While 1615–1805 kHz has not

[1] The agenda for any ITU WARC may be changed in accordance with Nos. 219–221 of the ITU Convention.

[2] The 1977 Aeronautical WARC has been postponed until 1978; the task of rearranging the Radio Regulations will be treated during the 1977 WARC for the planning of the broadcasting satellite service at 12 GHz.

been included in the table at this time, additional spectrum space in this band for AM Broadcasting will continue to be considered in view of the potential heavy demand for new stations by commercial, non-commercial, and minority group applicants and in view of the direct public interest benefits of this service. The use of reduced channel spacing (e.g. 8 or 9 kHz) has also been addressed by the SWG. While Regions 1 and 3 have adopted plans to reduce channel separation as a means of increasing the number of channels, this scheme affects adjacent channel interference, the development of AM stereo, and poses serious conversion problems for the U.S. which has developed its AM service largely around the use of directional antennas designed for use only on specific frequencies. Comments on this issue and the extension of the broadcast band to 1805 kHz are requested.

12. The International Broadcasting SWG indicated that additional spectrum was required, particularly at 3900–4000 kHz. We have not proposed any change to the band 3900–4000 kHz, which permits broadcasting in certain regions under specified conditions. Although the recent LF/MF conference rejects the use of single side band, we feel this technique should be examined and commented upon.

13. The Auxiliary Broadcast SWG requested that allocations be retained that would permit the use of the frequencies 1606, 1622, and 1646 kHz. We believe that the proposed table is adequate to continue to permit operations on these frequencies, possibly on a secondary basis domestically to regular AM broadcast operation if the AM band is expanded. On this basis the request of the SWG is fulfilled.

FIXED

14. We have suppressed the Fixed Service in several bands below 4000 kHz. This is based on long term projected usage, and on the advent of other techniques used to satisfy the needs once provided by this service. We believe that these suppressions adequately reflect the comments provided by the HF Fixed SWG.

AERONAUTICAL MOBILE

15. The Aeronautical SWG requested that the allocations for the Aeronautical Mobile (R) Service in the bands 2850–3025 and 3400–3500 kHz be maintained. As the table shows, we are proposing such a continuation.

MARITIME MOBILE

16. The Maritime Mobile SWG requested deletion of the Maritime Mobile Service from the bands 70–90, 90–110, 110–130, 130–150, and 150–160 kHz. Because of the needs of Government users, it has not been possible to adopt those proposals.

RADIONAVIGATION

17. The Aeronautical Service Working Group requested that the allocations to Radionavigation at 10–14 kHz and 90–110 kHz be maintained, that RR No. 168 in the band 110–130 kHz be suppressed for all regions, and that allocations to the Aeronautical Radionavigation service be provided between 160 and 490 kHz. It also indicated that there is no longer a need for the allocation to Aeronautical Radionavigation in the band 1605–2000 kHz.

18. As our proposed table shows, we have continued the allocations at 10 kHz and 90 kHz and have suppressed RR No. 168. Unfortunately we cannot accommodate the total request for spectrum between 160 and 490 kHz; however, we are proposing that Aeronautical Radionavigation be added on a secondary basis in all regions in the band 415–490 kHz. The extent to which this service can share with the Maritime Mobile (Primary) Service is unknown; we invite comments on this issue. Between 1605–2000 kHz; Radionavigation has been deleted from several bands as requested. There is an urgent requirement for aeronautical radionavigation in Region 2 in the 190–200 kHz band to accommodate additional non-Government non-directional beacons primarily for off-shore oil drilling operations.

19. The Government users requested that the Aeronautical Radio-navigation Service be allocated as a permitted service in the band 510–525 kHz; the slant(/) bars in the table are an indication of this proposal. The Government also requested that radio beacons be permitted to operate in the bands 275–285 kHz and 325–335 kHz; as the table shows we are proposing allocations to the Radionavigation Service in those bands.

RADIOLOCATION

20. The Maritime Mobile SWG requested that Radiolocation be added as a secondary service in the 1800–2000 kHz band; we have partially satisfied this request by adding Radiolocation between 1900 and 2000 kHz.

SPECTRUM BETWEEN 4000 KHZ AND 27.5 MHZ

21. It is apparent from a review of submitted requirements for frequencies in this range that this severely congested portion of the radio spectrum will continue to be heavily utilized by many services over the coming years. Even with the introduction of more sophisticated technology (e.g., use of satellites) there are ever increasing needs to satisfy long distance communication requirements, particularly for the mobile services, which can best be met through the use of HF spectrum. Thus we are faced with a situation where the demands for additional spectrum are great, and where only a relatively small portion of spectrum can be relinquished by some users to satisfy the needs of others. After analyzing all of these needs, including those of the Federal Government, it has not been possible to fulfill all the submitted requirements for frequency allocations.

22. The proposed frequency allocation table in Annex 1 does not allocate any additional spectrum to the high frequency broadcasting service as requested by the SWG. Our reasons for not including additional spectrum space are contained in the broadcast paragraph below. In the table, some spectrum now allocated to the fixed services has been reallocated to satisfy other requirements. We are advocating this approach because major non-government users of this spectrum have indicated a willingness to relinquish allocations to the Fixed services as they implement systems using higher technology. Problems could occur, however, if government users cannot vacate the occupied spectrum, or, if other nations relying upon lesser technology require additional spectrum to satisfy their own communication needs. Another possible approach is to permit sharing by the Fixed and Broadcasting services. For instance, some International Broadcast high frequencies are heavily occupied during the evening and mid morning hours, but are lightly used during the remainder of the day. They could be candidates for sharing. It is likely that there are also frequencies allocated to the Fixed services which could be time shared by broadcasting. We invite particular comments on the feasibility of sharing HF spectrum by the Fixed and Broadcasting services.

23. In the following paragraphs we will present a service by service anaysis of submitted requirements and our solution as reflected in the proposed frequency allocation table.

AMATEUR

24. The Amateur Service Working Group requested expansion of the Amateur allocations at 7, 14 and 21 MHz. Additionally, the SWG requested new allocations at 10, 18, and 24 MHz for the Amateur services. In both cases, wholesale relocation and reduction of existing Fixed services allocations would be required, with other services being affected to a lesser degree. In the presence of requests from other services whose needs we deem to be more pressing, we have not been able to fulfill the total requests of the Amateur SWG. We are, however, proposing some expansion at 7, 14, and 21 MHz, as set forth in the proposed table.

BROADCAST

25. The Auxiliary Broadcast SWG requested that the band 25870–26470 kHz be continued without change. This is the only band domestically allocated for Auxiliary Broadcast use within the HF spectrum; the FCC Rules presently provide for the operation of Remote Pick-up Broadcast in the band. This band is presently internationally allocated in part to the Broadcasting service (25600–26100 kHz) [1] and in part to the Fixed and Mobile services (26100–27500 kHz). Sufficient national flexibility is expected to exist after the 1979 WARC so that any required adjustments in domestic band limits can be made to provide for the continued operation of Remote Pick-up Broadcast at this megahertz order. On this basis, the request of the Auxiliary Broadcasting SWG is fulfilled.

26. The International Broadcasting (SWG) requested retention of their pres-

[1] 25850–26050 proposed to be reallocated to Radio Astronomy in attached Table.

ent allocations of a total of 2150 kHz and additional world-wide allocations of more than 2000 kHz; this amount would double the current allocation and include approximately 20 percent of the spectrum available between 4 and 27.5 MHz.

27. The Commission currently licenses ten transmitters for operation in the high frequency bands allocated to broadcasting, approximately 5 percent of the total U.S. broadcasting; the other 95 percent of U.S. HF Broadcasting is conducted by the U.S. Government through USIA and the Board for International Broadcasting. Presently, throughout the world, there are approximately 1500 transmitters on the air carrying about 22,000 daily frequency hours. Two or three international shortwave broadcasters operating on one frequency is a common occurrence. The U.S. requirements for additional spectrum in the HF band are under consideration by the cognizant Federal Agencies and have not been considered in this Notice of Inquiry.

28. A report of the Presidential Study Commission on International Radio Broadcasting entitled "The Right to Know" (February, 1973) provided a quantitative analysis of International Broadcasting. Between the years 1970 and 1972 the total U.S. program hours per week decreased; the data for the U.S.S.R. for the same period also showed a decrease. When the data for all major external broadcasters (22 countries) for the same period is considered, there was an increase of program hours per week of approximately 2 percent. From this we conclude that the requirement for channel hours is static.

29. The broadcast service does not presently use the single sideband type of emission. As a result of work performed by a panel of experts established by the ARC 1959, much of the operations of the Maritime Mobile, Aeronautical Mobile, and Fixed services have already converted, or, are in the process of converting to the use of SSB. SSB utilizes approximately half the bandwidth compared to double sideband, which makes SSB attractive in the above services. The same reasoning cannot be automatically assumed for a broadcast service. Its implementation could, possibly mean a halving of the broadcast spectrum requirements, or conversely, a doubling of program hour capacity within the currently allocated spectrum. However, there are technical problems involved which have to be resolved before SSB could be used for broadcast service. This is presently under study by the CCIR, Question 25/10 Compatible S.S.B. Transmission for AM Sound Broadcasting Service. Comments on this issue are requested.

30. The NOI shows only the presently allocated high frequency broadcasting bands since any re-allocation of the spectrum to high frequency broadcasting is still under study by the U.S. Government.

FIXED

31. The report of the HF Fixed SWG indicates that some major licensees are willing to reduce the amount of allocated spectrum by approximately 35 percent after 1982. However, the Government users indicate that they have a continuing requirement for this service in order to satisfy needs of existing systems. To further complicate the situation, the Aviation SWG urges that HF spectrum allocated to the Fixed service and used for their point-to-point operations continue to be available. In addition, the Private Land Mobile SWG requests that those frequencies in the Fixed service bands which are used by that service (for longer distance communications between 4 and 8 MHz) continue to be available.

32. It is our belief that the outcome of the 1979 WARC will not result in a large scale reduction of the amount of spectrum between 4 and 27.5 MHz which is currently allocated to the Fixed service. It is expected that the developing nations, in particular, will have a large and continuing need for Fixed service allocations, primarily to satisfy internal national (domestic) communication requirements. Still, the advent of uses of new techniques (e.g., cable, satellites) by major common carriers indicates that portions of the spectrum now allocated to the Fixed service will not be needed by that service in the future. In view of this, we have reduced the spectrum available in many of the Fixed service bands. The spectrum thus obtained has been used to satisfy the requirements of other services. We believe that the rearrangement of allocations set forth in the proposed table is a practical compromise between reduction of the spectrum allocated to the Fixed service and the needs expressed by other services. Further, we believe that the proposed reduction of the spectrum allocated to the Fixed service will not impose major hardship or loss of needed circuits upon those users who will continue to require frequencies in the HF Fixed service bands.

AERONAUTICAL MOBILE

33. The Aviation SWG requested that the current allocations to the Aeronautical Mobile (R) Service at HF be continued except for a small expansion of the band 21870–22000 kHz to 21850–22000 kHz which would require relocation of the Radio Astronomy Service. The Radio Astronomers have indicated that if their request for spectrum in the vicinity of 26 MHz is fulfilled, then the spectrum at 21850–21870 kHz can be released. As discussed later, that request is being satisfied; and, therefore, the band 21850–21870 kHz can be proposed for international reallocation to the Aeronautical Mobile (R) Service. The Aviation SWG further requested that the Aeronautical Fixed Service be deleted from the band 21870–22000 kHz which is presently allocated on a primary basis to both the Aeronautical Fixed and Aeronautical Mobile (R) Services; as the proposed table indicates, we are adopting this proposal.

MOBILE

34. The Citizens Band SWG requested the allocation of one megahertz of spectrum in the 26–28 MHz range, to include the band 26960–27540 kHz. The SWG furthur requested that this service be redesignated as the "General Radio Service", and that this new service be recognized internationally by the inclusion of it and its associated spectrum in the ITU table of frequency allocations. The utilization of Citizens Band frequencies in the U.S. is extensive by any standard, with the uses extending into nearly every area of personal and business communications. However, we are unable to endorse the principle of advancing an international allocation for a specific service, such as the "General Radio Service", particularly when the need for such a service has not been advanced internationally, on a large scale. Further, an effort to establish CB as the "General Radio Service" could well work against the expansion of spectrum desired by the Citizens Band SWG since future domestic allocation actions may well provide for expanded spectrum. Thus, we are proposing to continue the present international allocation at 26100–27500 kHz for Fixed and Mobile (except Aeronautical Mobile), which is used domestically in part by the Citizens Radio Service. While the actual desires of the SWG have not been fulfilled, we feel that our proposal will prove to be the most beneficial one for the needs of the service in the long range future.

35. The private Land Mobile SWG requested that the frequency 4383.8 kHz be allocated internationally for search and rescue, national disaster, and wildfire operations. It also requested that the allocations containing the bands 25.01–25.33 MHz, 27.23–27.28 MHz, and 27.28–27.54 MHz be continued unchanged; these bands are used domestically for Land Mobile services.

36. Since the frequency 4383.8 kHz falls within the ITU Appendix 25 MAR2 allotment plan for Maritime Mobile Coast Radiotelephone Stations, and there is already severe congestion in that service, we cannot propose that frequency for the requested purpose. Our proposed table contains no changes affecting the allocations containing the aforementioned bands; however, if the Commission implements the proposals in FCC Docket No. 20813 (pertaining to the Maritime Mobile service), then the frequencies 25.08 MHz and 25.10 MHz would not be available for use by the Land Mobile service.

37. The U.S. Government stated a requirement for mobile use of more than 4200 kHz of spectrum which is to be shared with the Fixed service in bands which are now allocated exclusively to that service.

MARITIME MOBILE

38. The Maritime Mobile users requested exclusive world-wide allocations

for an additional 1652 kHz of spectrum in the bands between 4 and 27.5 MHz; that is, an increase from the currently available 3850 kHz to 5502 kHz.

39. Aside from an allocation of 90 kHz band at 25 MHz by the 1959 ARC, the frequency bands allocated to the Maritime Mobile Services have remained unchanged from 1947 to the present date. Statistics for the period 1947 through 1974 show that the number of vessels of size 1000 gross tons and over in the merchant fleets of the world has increased approximately 80%. Two operational characteristics have significantly changed during this period. First, the speed of ocean vessels has substantially increased; second, the turn-around time of vessels in port has substantially decreased. As a result, there is a greater number of voyages per year; the time a vessel spends at sea is greater. Further, the vessels themselves have become more sophisticated, as have the loading and unloading techniques; this greater sophistication creates greater needs for more reliable communications. In order to meet those needs the users of the Maritime Mobile service bands have attempted to opitimize the utilization of the present allocations by applying new technology and new techniques (e.g., reduced bandwidths for Radiotelephony and A1 Morse, Digital Selective Calling Systems) together with improved operating procedures (e.g., updated A1 Morse Calling Procedure).

40. We feel that as world population grows and the merchant fleets become ever larger and more sophisticated, there will be an increasing demand for reliable communications. We could not fulfill the allocations as requested by the Maritime users because we must consider the demands of other services and of Government users; however, we have provided for expansions of the present allocations as shown in the proposed table. The proposed allocation contains expansions at 4 MHz, 8 MHz, 12 MHz, 16/17 MHz, and 22 MHz. We have also proposed new allocations in the 5 MHz and 21 MHz band.

Radio Astronomy

41. The Radio Astronomy SWG requested world wide allocations of 50 kHz of spectrum between 10 and 13 MHz and 500 kHz of spectrum at the 26000 kHz frequency order. As the proposed table shows, we have provided 50 kHz between 13360–13410 kHz and 200 kHz in the band 25850–26050 kHz. In accordance with the views expressed by the SWG, the band 21850–21870 kHz, which is currently allocated to the Radio Astronomy service, has been re-allocated to the other services.

Spectrum Between 27.5 MHz and 1215 MHz

42. Our review of the comments submitted in response to the previous Notices of Inquiry, the rquirements submitted by the Service Working Groups, and the requirements specified by the Federal Government indicate that this portion of the spectrum may be the most contentious portion to be considered in preparation for the 1979 WARC, and perhaps at the conference itself.

43. In Region 2, the FM and TV Broadcasting Services have exclusive international access to about 37 percent of the spectrum services. In the United States, the band 470–890 MHz has provided for UHF–TV channels 14 through 83 (70 channels each 6 MHz wide). Commission decisions in Dockets 18261 and 18262 provided for the use of land mobile services on channels 14 through 20 in specific locations in the United States, and the complete reallocation to land mobile of the top 14 channels (70–83). Also the use of Channel 37 by radio astronomy therby reduces the percentage of exclusive broadcast spectrum from 37 percent to 26.4 percent. The use of channels 14 through 20 by land mobile was authorized to accommodate short term requirements, since equipment was readily available for that frequency range and was not available for the 806–890 MHz range. Future expansion was to take place in the spectrum allocated to Channels 70–83.

44. Several service working groups have submitted requests for additional spectrum space between 470–806 MHz to accommodate predicted future expansion. In addition to the government users have stated requirements in the same band. These requests are listed below.

45. On October 13, 1976, the Commission formed a task force to assist it in the determination of services in the UHF–TV band in view of the demands being made upon that portion of the spectrum by radio services. The Task Force is still being organized and it is not possible at this time to determine the extent to which its study will contribute to the WARC preparations.

46. Nonetheless, for purposes of this Notice and, because of unresolved questions regarding multi-faceted demands by Government and non-Government entities for access to spectrum in the 470–806 MHz band, we are not herein proposing allocation changes affecting that band. However, we have proposed to align the international table with the domestic table for the band 806–890 MHz in Region 2. To assist in formulating our approach to this important region of the spectrum, information is solicited from interested parties on the following areas which seek to focus on: spectrum requirements for any service and related justification in order to provide a basis for selection of that requirement over others; alternatives to the use of spectrum between 470 and 890 MHz; technical and operational characteristics of services; and factors such as saturation of a market which may potentially limit the amount of spectrum required for any service.

47. Specific questions are as follows:

(1) Since it is not possible to satisfy all broadcast and non-broadcast services stated spectrum requirements in the band between 470 and 890 MHz, each service is requested to provide justification which may provide a basis for selection of one service's requirements over others. What quantitative and qualitative benefits are expected to be derived from use of UHF spectrum for one service as compared to another? What opportunity benefits may be lost or future costs incurred due to inaccessability of spectrum as between services?

(2) The planning period for which the WARC is intended to cover extends to the year 2000. What alternatives exist for the various services to the use of spectrum between 470 and 890 MHz during that period? For example, to what extent will satellite delivery of programs to TV cable heads syphon off over-the-air viewers and will that service diminish the requirements for UHF–TV? To what extent will video cassettes and discs compete for attention of-the-air TV viewers? To what extent can the expanded mobile service requirements be satisfied by satellite and terrestrial systems above 1 GHz?

(3) Technical and operational characteristics of services provide some indications as to whether spectrum sharing may be appropriate. For example, the nature of the aeronautical mobile (R), Broadcasting and Radio Astronomy services prevents their successfully sharing spectrum. Safety considerations may also prevent sharing between services. With such constraints in mind what service may be expected to successfully share spectrum and what technical and operational criteria are appropriate to effect such sharing, particularly with respect to international services?

(4) There are factors such as saturation of a market by a service or substitution of one kind of service (e.g., common carrier cellular systems) for another (e.g., private land mobile systems) which may potentially limit the amount of spectrum required for any service. Given the extended planning period, to what extent should such factors be expected to aid in releasing spectrum from one service for use by another?

48. The requests for spectrum in the UHF–TV band far exceed the amount available as can be seen in the following list:

Service	Band of interest (megahertz)	Requirements
Non-Government users:		
Aeronautical mobile	584–614	30 MHz.
Broadcasting satellite	620–450	6 MHz.
Citizens radio	470–947	10 MHz.
FM broadcast	782–806	24 MHz.
Land mobile	470–890	420 MHz.[1]
Maritime mobile	470–890	18.55 MHz.
Radio astronomy	602–614	6 MHz.
Television broadcast	470–890	420 MHz.
Government users:		
Fixed	470–806	Total of
Mobile	470–806	300 MHz.
Mobile satellite	470–806	
Radioastronomy	608–614	6 MHz.[2]

[1] Includes some overlap between domestic and private and mobile users.

[2] The Federal Government proposes that this allocation to the radioastronomy service be on exclusive worldwide basis.

49. It is obvious that in the event a decision is reached to permit services other than television into the UHF–TV band that the requirements set forth above cannot be accommodated. If a decision is reached that the UHF–TV band will not be shared with any other

service at all this will affect allocations in other frequency ranges. A current analysis of submitted requirements and a solution as reflected in the proposed frequency allocation table, except for the 470–806 MHz band, is presented in the following paragraphs.

AMATEUR

50. The Amateur Radio SWG requested that present allocations between 27.5 and 1215 MHz be maintained, that provision be made for Amateur-Satellite operations in the band 220–223 MHz, and that Amateur operations be permitted in the band 902–928 MHz. At this time, no conflicts appear to the first two allocations requests. As the table shows, we propose to provide a primary allocation for Amateur Satellite at 220-225 MHz. Amateur operations in the band 902–928 MHz for Region 2 are proposed as a secondary service.

BROADCASTING

51. The Auxiliary Broadcast services comprise Remote Pickup Broadcast Stations, Aural Broadcast Studio Transmission Links (STL), Intercity Relay Stations, and Television Auxiliary Broadcast stations. The SWG requested retention of existing allocations in the band 150–174 MHz and 450–460 MHz for Remote Pickup Broadcast stations. In addition, the SWG requested that the service be permited to share additional frequencies in the 150–174 MHz band and an additional 1 MHz betwen 450 and 460 MHz for Remote Pickup Stations. The existing international allocations (and our proposed table) can provide for these requirements; however, the granting of additional spectrum or the creating of sharing arrangements for the use of more spectrum in these bands are issues to be addressed by domestic rule making. The SWG also requested the band 942–947 MHz for Aural Broadcast STL uses; this would require retention of the Fixed service allocation in the existing international table. The domestic allocations table now specifies an exclusive allocation to the Land Mobile service in this band as a result of our decision in Docket 18262; and the Land Mobile SWG has requested that this allocation be extended to the international table. In order to provide flexibility in the international table, we are proposing primary allocations to both Fixed and Mobile services in the band.

52. The FM Broadcasting SWG stated that the present FM band (88–108 MHz) should be preserved and that a new FM service should be created in the UHF band at 782–806[4] MHz to satisfy Broadcast needs through the year 2000. The SWG pointed out that the original 1963 FCC allocation of 2830 channels to 1858 communities is now 84 percent utilized and that it is likely that the remaining unused channels will be occupied in the foreseeable future.

[4] On October 11, 1976 the FM SWG requested the band 806–830 MHz in lieu of 782–806 MHz.

53. The Television Broadcasting SWG requested retention of the full complement of VHF and UHF frequencies now available for television broadcasting, the termination of Land Mobile sharing of UHF TV channels 14 through 20, the continued access of TV translators to channels 70–83, the retention of TV channel bandwith at 6 MHz, and the rejection of proposals to reallocate present VHF and UHF TV spectrum. The SWG believes that the American Public interest relies heavily on the maintenance and growth of the U.S. Television Broadcast Service. The SWG stated that if the above requests are not fulfilled, television service will not continue to provide a locally-based yet nationwide service; service to the public will be degraded or eliminated; and a large investment of the public in receiving and transmitting equipment will be lost. The SWG further stated that the UHF television band has shown steadily increasing utilization. Between 1960 and 1975 the number of UHF stations on the air changed from 85 to 352, an increase of about 300 percent. The 1976 number includes 162 public television stations, and the SWG states that the Public Broadcasting Service projects that more than 420 public television stations will be in operation in the UHF band by the year 2000.

54. The Satellite Broadcasting SWG requested 6 MHz of spectrum between 420–450 MHz. The SWG stated that this spectrum represents the most practical region for early aural broadcast satellite development. As the band 420-450 MHz does not seem viable to sharing of this service, it was placed as a requirement in the 470–806 MHz band.

55. As mentioned in paragraph 45–47, the allocations in the 470–806 MHz band are undergoing intensive review. In submitting its proposals to the International Telecommunication Conference in 1979 the United States must strive to maintain maximum flexibility when including requirements in the 470–806 MHz band as in all bands.

FIXED

56. The Private Microwave SWG requested that existing allocations in the frequency bands 947–952 MHz and 952–960 MHz be maintained for the exclusive use of the Fixed service and that the designator "Operational-Fixed" be introduced into the band 947–952 MHz.

57. We are proposing that the band 947–952 MHz be maintained for the exclusive use of the Fixed service in Region 2; however, introduction of the designator pertains to specialized services recognized in the United States and is more properly addressed in domestic rule making. As to the frequency band 925–960 MHz, we have provided for the introduction of the Mobile service coequal with the Fixed service in order to accommodate projected growth in that service. Domestic rule making would be required to determine specifically which frequencies, if any, should be re-allocated to Mobile services.

MOBILE

58. The Common Carrier Land Mobile SWG requested that existing allocations be maintained at 30 MHz, 150–160 MHz, and 450–470 MHz. It also requested that the Commission decisions reached in FCC Dockets 18261 and 18262 be reflected in the International Table of Allocations, that an offshore telecommunications service be recognized internationally in the 470–512 MHz band. The Aviation SWG requested that two bands each 6 MHz wide be allocated in the band 806–960 MHz for a world-wide public Air-Ground communications service, in order to provide a non-safety public Air-Ground service.

59. The offshore service is intended to provide communication between Mobile stations and between Mobiles and Drilling Platforms; it must operate in accordance with criteria which provide protection from interference to existing UHF-TV stations. The worldwide public Air-Ground service would provide voice and record communications between aircraft and the telephone and record network. At present, twelve frequency pairs between 450–460 MHz provide for Domestic Public Air-Ground communications. The Aviation SWG stated that the business aircraft fleet in the U.S. increased by nearly 20 percent during 1973 and 1974 with 1975 growth continued strong; we can expect the demand for public radiotelephone service to grow at a rate commensurate with the fleet itself

60. The proposed table retains the allocations to the mobile services at 30, 150, and 450 MHz. In addition we have provided for mobile, which could include the public Air-Ground Radiotelephone Service, in the bands 896–902 MHz and 941–947 MHz. (The Government has noted that this service may have problems sharing with the radiolocation service in other regions.) Depending upon the results of the intensive review of requirements for the UHF-TV spectrum, an international allocation proposal may or may not be appropriate.

CITIZENS RADIO

61. The Citizens Radio SWG requested an additional allocation of 1 MHz in the 26–28 MHz band, a 5 MHz allocation in the band 216–300 MHz with 220–225 MHz preferred, and a 10 MHz allocation between 470 and 947 MHz, preferably between 890 and 947 MHz. These are needed to meet the explosive growth of CB and to provide additional services such as channels for repeater operations, municipal service tie-ins, and weather information.

62. There is already a provision for the Mobile service between 27.5 and 28 MHz in the International Table, so no change is required, recognizing, however, that in the U.S. the band 27.54–28 MHz is subject to exclusive government use. We are proposing that the band 220–225 MHz be allocated for shared use by the Mobile Service with the Amateur, Amateur-Satellite and Radiolocation Services. Part of this band could be allocated domestically to the Citizens Radio Service,

if it is eventually decided that this allocation would be in the public interest. As our table shows, we also propose to meet the requirements of the Mobile services by providing access to the band 890–947 MHz; use of these frequencies by the Citizens Radio Service could result from domestic rulemaking.

PRIVATE LAND MOBILE

63. The Private Land Mobile SWG requested that a new service for Land Mobile be introduced into the international table of allocations to delineate existing Land Mobile operations below 470 MHz. It is also requested that the band 470–806 MHz be allocated in Region 2 to Land Mobile on a co-equal basis with Broadcasting and that the band 806–960 MHz be allocated in Region 2 to Land Mobile on a primary basis.

64. Based upon several projections of Commission License Records of the Base stations authorized during the period 1950 through 1975 in the Private Land Mobile services, it may be expected that the number of Base station transmitters in the year 2000 will be at least 5.5 times that in 1975. This growth prediction is based only on current uses and does not take into account growth due to new types of uses (e.g., Medical systems, Highway Safety systems), less expensive equipments, increased use of hand carried units, or increased mobility of the population. However, the growth in frequency requirements may be controlled by increasing the efficiency of spectrum utilization. While the SWG saw little promise in the foreseeable future for decreasing channel bandwidths through channel splitting or the use of single sideband modulation, there exists a potential for spectrum conservation through the use of more efficient assignment methods, the use of cellular systems (space division multiplexing), and the use of trunking techniques which allow multiple channels to be accessed by a large number of users.

65. The specific spectrum requirements for the Private Land Mobile Radio Services in the long term future, as with other domestic radio services, are more properly addressed in future domestic rulemakings. In this regard, there are no compelling reasons to introduce land mobile as a new service with its own specific frequency allocations; flexibility is the most important goal.

66. Once again, the disposition of the UHF–TV spectrum will affect the allocations to be made finally to this service. The proposed table shows that the allocations to the Mobile Service below 470 MHz have been maintained. It also shows new primary allocations to the Mobile Service in the bands 806–902, 928–947, and 952–960 MHz and a new secondary allocation in the band 902–928 MHz. The latter was made secondary in order to protect Government operations in the Radiolocation Service in Region 2; we invite comments on the difficulties which may arise with sharing in this band and on the impact of the ISM (Industrial, Scientific, Medical) operation which also occurs in this band.

AERONAUTICAL MOBILE

67. The Aviation SWG requested that existing allocations to the Aeronautical Mobile (R) Service be maintained with slight modifications to provide for full satellite and terrestrial applications in exclusive Aeronautical-Mobile (R) bands. In addition, it requested new spectrum allocations consisting of the bands 140–144 MHz, 146–150 MHz, and 584–614 MHz. The additional spectrum is needed to satisfy expanded growth needs of the service and to accommodate planned development of an integrated communications-navigation system which is expected to provide for additional functions associated with operational control and not presently provided. These will include functions such as crew physiological and performance monitoring, engine parameters monitoring, and logistics-servcies functions which are needed as a result of current and future high performance, high capacity aircraft during the period from now until the year 2000.

68. We have satisfied the proposals for existing allocations, but were unable to satisfy any of the requests for new spectrum. In attempts to satisfy the requests, the bands 136–138, 140–144 and 148–149.9 MHz were investigated. However, the Government users advised that, due to current and projected applications, they are unable to relinquish any frequencies in these bands to satisfy this requirement. Comments are solicited on this issue, and further, other possible frequency bands which might be suitable for aeronautical mobile (R) use.

MARITIME MOBILE

69. The Maritime Mobile SWG requested that the existing allocations in the band 27.5–1215 MHz be maintained, and that either the RR No. 287 which restricts the use of internationally allocated frequencies in the band 156–174 MHz be removed, or, in the event it is not practicable to do so, the band 582–606 MHz be reallocated to the Maritime Mobile Service.

70. The SWG stated that full use of the existing allocations as specified in Appendix 18 to the ITU Radio Regulations is prevented by RR No. 287 which gives each administration the discretion to determine the licensing policies to be followed domestically. Although Appendix 18 provides 90 frequencies (each 25 kHz wide) for international Maritime use, in the United States 59 of the frequencies are allocated to Maritime services, while the remainder are allocated to Land Mobile services.

71. As a result of domestic rules, only 9 full duplex channels (2 frequencies per channel) of 28 allocated internationally are available to provide public correspondence service to the U.S. Maritime markets. The SWG reported a review of Bell System VHF station statistics which shows a growth in public correspondence traffic average 20% per year for the years 1971 through 1974. This traffic is due to smaller boats as well as domestic and international commercial shipping; in fact, there has been an increase of 40,000 small boat licensees in each of the years 1974 and 1975. Further, the Department of Commerce is sponsoring efforts to develop systems which will permit unattended direct dialing between vessels and standard landline telephones, and this should increase the incentive for calls between vessels and shore. The SWG estimates that 250 full-duplex channels (i.e., 2 bands each 6.25 MHz wide) will be required to meet the demands for public correspondence service and private operational systems by the year 2000.

72. Within the U.S. there are no full duplex channels available for the ship movement service, a safety service which provides control of ship movement in confined waters; however, the Department of Transportation has sponsored the development of a domestic simplex vessel traffic service (VTS) and operates such a system in several major maritime ports. If VTS will continue to be used only by larger vessels and will continue to operate in the simplex mode, then the future frequency requirement will be for eight simplex channels each 25 kHz wide.

73. Beyond the requirements for public correspondence and ship movement, the SWG identified a need for radiotelephony service between coast and ship, a radiotelegraphy full duplex service, and a full duplex service for on-board communications which are used to support operations conducted while in port. These uses would require an additional 2.85 MHz beyond existing allocations. Finally, need exists for an allocation of 3 MHz to be shared between Aeronautical and Maritime Services in support of high priority, short range coordinated communication efforts such as search and rescue and antipollution operations.

74. Little hope is held of satisfying existing requirements on Appendix 18 frequencies and inadequate spectrum is available for growth between 150 and 174 MHz, and it appears that the future requirements will have to be satisfied at UHF frequencies. We were unable to satisfy the needs for new spectrum at this time; the satisfaction of these needs awaits the results of the intensive review of the UHF spectrum.

RADIO ASTRONOMY

75. The Radio Astronomy SWG requested that existing allocations in the band 27.5–1215 MHz be maintained or expanded and that new worldwide allocations be provided in the bands 150.05–153 MHz and 608–614 MHz (preferably, 602–614 MHz). The SWG sought coequal status with Fixed and Mobile services in the band 37.5–38.25 MHz, for observations of phenomena such as solar bursts, and in the band 406.1–414 MHz for observations of pulsars. In addition, the SWG desired modifications to ITU footnotes in the band 73.00–74.60 MHz in order to provide for exclusive use of the band by Radio Astronomy.

76. While existing and planned use of the frequencies at 37.5 MHz prevent a primary allocation, our proposed table provides for radio astronomy to be included as a secondary service within the band 30.01–37.75 MHz. The footnotes to

the band 73.00–74.60 MHz have been modified to obtain the discontinuance of Fixed, Mobile, and Broadcast operations before January 1986.

77. We cannot accommodate the request by the SWG for a new allocation in the band 150.05–153 MHz because there is heavy existing and planned use of these frequencies by the Land Mobile Service. The requests for spectrum in the 602–614 MHz band must await the outcome of the intensive review of the UHF band. The Federal Government has advised, however, that it supports a proposal to provide a worldwide exclusive allocation to radio astronomy in the 608–614 MHz band.

SPECTRUM BETWEEN 1215 MHZ AND 10.7 GHZ

78. A considerable portion of this part of the spectrum remains without change in the proposed frequency allocations table. The needs of most services occupying segments of the band are growing along with expanding technology, so that justification for retention of spectrum is obvious. In most cases where the needs require allocation of additional spectrum they were accommodated by expansion in, or near to, the bands already occupied; this necessitates sharing by services, but in this portion of the spectrum techniques for sharing are well-defined.

79. The U.S. Government requirements have been considered in the development of the proposed table; however there are instances where the Government proposals have not been definitely established. These occur mostly in bands which are domestically reserved for Government use, and forthcoming proposals will be reflected in future notices.

80. Two major problem areas arose in the development of the allocations table. The first concerns the accommodation of the needs of the commercial fixed satellite service. The use of this service is increasing at a rapid rate, and there will be a need for an additional 1500 MHz by the early 1990's.* At this time, we have not accommodated the total need; we are continuing to seek a solution to the problem. The second problem area concerns the accommodation of the needs of passive services such as earth exploration satellites and radio astronomy which are performing basic and applied research. The measurements made by these services are frequency dependent and must be interference free. Although the operations are now considered experimental, it should be noted that the benefits derived may result in commonly used systems (such as happened with meteorological and communications satellites).

81. In the following paragraphs we will discuss the needs of the services using this portion of the spectrum and the proposed table of frequency allocations.

AMATEUR/AMATEUR SATELLITE

82. The Amateur Radio SWG requested that the present allocation at 1215–1300, 2300–2450, 3300–3500, 5650–5925 and 10000–10500 be maintained. They stated that the relatively wide, but shared, allocations are necessary to permit experiments with wide-band emissions and to prevent interference to/from users in adjacent bands. They also requested that a small segment in each of these bands be allocated to the Amateur Satellite Service in order to permit experimentation with space communication techniques. They pointed out that a 2304.1 MHz beacon was built into the OSCAR 7 satellite but could not be utilized for lack of an international allocation.

83. As the proposed table shows, we have maintained the present allocations and have provided for the amateur satellite service as a secondary service in the bands 1290–1300, 2310–2320, 3400–3410, and 5650–5670 MHz. Thus the request is basically fulfilled; however, government users have not yet agreed to sharing the band 3400–3410 MHz with the amateur satellite service.

AERONAUTICAL/AERONAUTICAL-MOBILE

84. The Aviation SWG requested allocations at 1710–1770 MHz for Aeronautical Mobile (R) service communications requirements, similar to the needs expressed for the bands 140–150 and 584–614 MHz. This request was not satisfied because of extensive use by government in this band.

85. The SWG also requested that present domestic use of the band 1435–1535 MHz for flight test telemetry be incorporated into the international table. Additionally, they requested a new allocation at 2300–2450 MHz for the same purpose. The first request was satisfied through incorporation of proposed RR No. 349C. Due to other requirements at 2300–2310 MHz, the second request was satisfied in part, also by the insertion of proposed RR No. 349C, for the 2310–2450 MHz band. The government has under consideration some modification to RR No. 383B.

86. Finally, the Aviation SWG proposed changes which would reflect the philosophy that space applications in the areonautical services as adopted at the 1971 of the aeronautical terrestrial services. The SWG pointed out that new aeronautical services as adopted at the 1971 WARC–Space Telecommunications Conference as neither necessary nor desirable. Further, it was their feeling that such an approach unduly complicates administration of the aeronautical services, and reduces flexibility while benefits from the establishment of them are not readily identifiable. Although these concepts were not included in the proposed table, comments on this issue are invited.

BROADCASTING/BROADCASTING-SATELLITE

87. The Broadcasting-Satellite Service working group has requested that the presently allocated band at 2500–2690 MHz be continued and expanded to include 2300–2500 MHz. They also requested that the band 3400–3700 MHz be allocated for use by the service. They state that the band 2500–2690 MHz has very favorable propagation characteristics and technology for its use is highly developed. Health and education communication experiments have been conducted in this band with the ATS–6 satellite, and it is well suited for community reception use in the near term. The requested expansion would double the orbit capacity for the band, while the requested new allocation would open a band almost as desirable as that at 2500 MHz. The request for additional spectrum by the Broadcasting-Satellite SWG will be discussed at length in the section dealing with frequency bands above 10.7 GHz. The Commision believes that the current frequency allocations to the broadcasting-Satellite Service are adequate to meet the foreseeable needs of this service. Consequently, the request of the Broadcasting-Satellite SWG to allocate additional frequencies of 2300–2500 MHz and 3400–3700 MHz has been denied.

88. The radio astronomers have indicated a need for expansion into the band 2670–2690 MHz to permit more efficient, interference free continuum measurements. Transmissions from the ATS–6 in the upper edge of the 2500–2690 GHz band have caused interference to the Radio Astronomy Service. This aspect of sharing has been discussed in the CCIR.* The Commission has, however, been persuaded for the time being by the arguments of the radio astronomy group and has proposed allocation of the 2670–2690 MHz band to the Radio Astronomy Service. This matter is still under consideration and the Commission invites comments on this allocation.

89. The broadcast auxiliary service group has requested the fixed allocation at 2110–2113 MHz for studio transmitter links and intercity relays and the fixed allocations at 1990–2110, 2450–2500, and 6875–7125 MHz for TV electronic news gathering. They have requested expansion into 1850–1990, 2113–2200, and 6425–6525 MHz. Since these are allocated Fixed currently, there is no need to change the international table; any expansion would be the subject of domestic rulemaking.

METEOROLOGICAL SATELLITE

90. This service provides weather information world-wide to users who receive it from satellites with relatively low cost earth terminals; the service is socially and economically valuable. In order to continue and improve the service the U.S. Government requested that all present allocations to the service be maintained and that additional spectrum be made available.

91. As the table shows, the present allocations are maintained and in addition, the band 1700–1710 MHz is proposed for exclusive world-wide allocation to the meteorological satellite service.

RADIONAVIGATION

92. The aviation SWG stated that the bands 1558.5–1636.5, 4200–4400, and 5000–5250 MHz are authorized for the devel-

*Fixed-Satellite Service Working Group Report.

*See Docs. 2/131 (11/212) from 1976 Interim CCIR Meetings, Draft New Report: Emission Measurements of the ATS-6 Satellite In The 2690–2700 MHz Radio Astronomy Band.

opment and use of earth satellite navigation systems, and it requested that the band 1710–1770 MHz also be authorized for such use in addition to providing for mobile communication needs. It requested that the band 1300–1350 MHz be expanded to 1215–1350 MHz to provide for expanded use of dual diversity long range radionavigation radars and that the band 2700–2900 MHz be continued to provide for dual diversity short range radionavigation radars. The SWG requested a new allocation in the band 3500–3700 MHz to permit operation by low cost short range radionavigation terminal radars at satellite airports. It also requested that allocations in the bands 4200–4400 MHz, which is used by radio altimeter, and the band 5000–5250 MHz which is used by Microwave Landing Systems be retained to permit continued and expanded use.

93. The Maritime SWG requested that the band 1575–1636.5 MHz be re-allocated to radionavigation in order to provide for aeronautical, maritime, and land use of the Global Positioning System now in advanced development. It also requested modification of the table or of the footnotes for the bands 2900–3100 MHz and 9300–9500 MHz in order to more directly specify the portions to be used by radar beacons, shipboard transponders, and shipboard radars; and it requested that the allocation of the band 5470–5650 MHz be retained for the maritime radionavigation service.

94. We could not accommodate the Aviation request at 1710–1770 MHz because this spectrum is more needed for the maritime-mobile satellite service and for fulfillment of Government requirements to track and control satellites (Space Operations). The bands 1240–1300 MHz and 1350–1370 MHz have been allocated to the Aeronautical Radionavigation service by means of a footnote and the allocation at 2700 MHz is retained. A new allocation to the Aeronautical Radionavigation service is proposed for Region 2 in the band 3500–3700 MHz and the allocations at 4200 MHz and 5000 MHz are retained. In order to fulfill Government requirements, we are proposing to include the Radionavigation Satellite service in the band 1215–1240 MHz and to split the band 1558.5–1636.5 MHz and specify allocations for satellite services. No changes are proposed for the allocations at 2900, 9300 and 5470 MHz.

Fixed

95. The Common Carrier users operate at 2, 4, and 6 GHz in this portion of the spectrum. The Radio Relay SWG stated that the spectrum at 2 GHz, which is used for narrowband microwave, would be better utilized if the permissible bandwidth were increased beyond the present 3.5 MHz and standard frequency plans were adopted. The spectrum at 4 and 6 GHz is used for long-haul communications. The areas around major metropolitan areas are already congested, and a steady growth in demand for service is anticipated as there are now approximately 3100 applications made per year for additional stations, additional communication path, and/or additional frequencies. In addition, the growth in the number of earth stations in the satellite service will lead to increasing coordination difficulties. Additional spectrum is required; and since the SWG felt that the density of use in the bands domestically allocated to the U.S. Government is 1/5 to 1/20 of that in the commercial bands, the SWG suggested that those bands be made available for sharing. The SWG requested additional spectrum in the bands 5650–5925, and 7300–7750 MHz and some portion of the band 3100–3700 MHz.

96. The Private Microwave service provides point to point service tailored to the specific needs of users such as governmental bodies, utility companies and transportation companies. The average growth rate was 12 percent over the period 1960–1970 and there is now well over one billion dollars invested in equipment. The users operate at 2 and 6 GHz; the spectrum at 6 GHz is already congested in urban areas and a three or four fold increase in demand is expected by the year 2000. The Private Microwave SWG also suggested that bands domestically allocated to the government be made available for sharing. The SWG requested additional spectrum of 270 MHz at 2 GHz and 1625 MHz at 6 GHz. It justified the large request by stating that only a small percentage of the spectrum may be available because it would be shared with other users.

97. We have not been successful to this time in accomodating these needs. The proposed allocation table does show a new allocation to the Fixed service in the band 3300–3400 MHz; however it is allocated as a secondary service due to government operations in the Radiolocation service.

Land Mobile Satellite

98. The Private Land Mobile SWG requested that the present allocations to the mobile services be retained to accommodate anticipated growth and the introduction of new services such as highway safety systems and medical systems. It also requested that the Land Mobile Satellite service be allocated spectrum in the bands 1427–1435, 2450–2500, and 8400–8500 MHz. This spectrum would be used in the future for long distance communications in operations such as cross-country trucking, railroading, and remote direction of emergency operations.

99. As the proposed table shows, this service has been included in the bands 2450–2500 and 8400–8500 MHz; this should provide sufficient spectrum for operations in the time frame considered by the 1979 WARC.

Space Research/Earth Exploration Satellite

100. The U.S. Government proposed several allocations for the Space Research and Earth Exploration Satellite services to permit remote operations by passive sensors. The operation of these sensors is discussed in more detail in the portion of this Notice treating the spectrum above 10.7 GHz because that is where most of the use occurs. The requirements for such operation in this portion of the spectrum are summarized in the following list.

Frequency band (GHz)	*Measurement/use*
1.3–1.427	Soil moisture—crop irrigation, water reservoir, and hydroelectric power management; crop yield and flood forecasting.
2.64–2.70	Sea and estuary salinity—climate forecasting, aquatic-life habitat monitoring and salt water intrusions or fresh water supplies and habitats.
4.95–5.0	Estuary surface temperature—habitat monitoring, fishery resource management, "red tide" warnings and thermal pollution monitoring.
6.425–7.125	Sea surface temperature—habitat monitoring, fishery resource management, and Gulf stream heat movements for long-term climate forecasting.

101. The request for an allocation at 6425 MHz will be satisfied by the addition of a footnote; however this allocation may in the future be given table status in some adjacent band. The passive services are shown in the proposed table at 4950 MHz; however the practicality of sharing these services with active services in this band, as well as the others requested, is still being studied. Comments on this issue are invited.

102. Another problem which remains to be solved concerning these services is a need to provide space to space communications in the Earth Exploration Satellite and space research services. This was requested in the band 2025–2120 MHz, but was not accommodated, and the feasibility of sharing is being studied.

Fixed Satellite

103. In this portion of the spectrum the commercial Fixed Satellite service presently operates in the 3700–4200 MHz downlink and 5925–6425 MHz uplink bands on a shared basis with Fixed and Mobile services. The Fixed Satellite SWG stated that in the ten year period 1965–1975 the growth in traffic as measured in channels handled by the INTELSAT system was approximately one hundred fold and the increase in numbers of earth station antennae was greater than tenfold. The INTELSAT system is now carrying the major part of the world's transoceanic telephone traffic and all of its TV; this is being done on a system which represents hundreds of millions of dollars invested. The spectrum at 4/6 GHz has been heavily utilized because the technology for its use is highly developed; it is likely that the demand on this spectrum will continue to grow for that reason—the economics and difficulties associated with the implementation of new technology will cause many users to seek operation in these bands. The SWG projected the present growth into the future and determined that 2800 MHz additional (for both uplinks and downlinks) would be required by the early 1990's.

104. In our discussions with the government users, we attempted to obtain allocations which would permit the commercial Fixed Satellite service to operate a downlink in the band 4400–4900 MHz paired with an uplink in the band 6425–6925 MHz and a downlink in the band 3400–3700 MHz paired with an uplink in the band 5625–5925 MHz. At this time, the government users have agreed to the proposal at 6425 MHz and are exploring means to provide the paired link.

RADIO ASTRONOMY

105. The radio astronomers expressed a number of desires for new or expanded allocations in this portion of the spectrum. They requested that: the band 1350–1400 be expanded to 1330 MHz by footnote to permit observation of neutral hydrogen gas from external galaxies; the band 1400–1427 MHz be expanded to 1370 MHz to permit observation of the hydrogen line and continuum measurements; the bands 1611.5–1612 and 1720–1721 MHz have strengthened footnotes or worldwide allocations to protect observation of the hydroxyl lines; the band 1660–1670 be given an exclusive allocation to permit observation of hydroxyl lines (the hydroxyl lines are important because they provide information vital to understanding the formation of stars, planets, and life); the band 2690–2700 be expanded to 2670 to permit more efficient continuum observations and cleared of the Broadcasting-Satellite[1] Service to permit interference free observations; the allocation for the band 4825–4835 MHz be upgraded to table status to protect very important observations of the formaldehyde line; and that the band 4990–5000 MHz be expanded to 4950 MHz to permit more efficient continuum measurements in this greatly observed band.

106. As the proposed table shows, we have gone far toward accommodating these requests. The requested expansions have been implemented where possible; however, we have not upgraded allocated spectrum at 1611.5 MHz and 1720 MHz from footnote to band status because we do not feel that to be necessary. The bands 1370–1400 MHz and 4950–4990 MHz are not yet agreed and remain under study because of possible sharing problems between passive and active operations (the radio astronomy service is shown in the table at 4950 MHz but not at 1370 MHz): comments on such problems in these bands are invited.

MARITIME MOBILE/MARITIME MOBILE-SATELLITE

107. The Maritime service working group requested expansion of the maritime mobile-satellite bands at 1535–1543.5 MHz and 1636.5–1645 MHz. A projected demand based upon international studies of existing communications applications and domestic studies of new medium and high data rate application (e.g., mobile drilling rigs, seismic exploration ships) indicates a need by the year 2000 of an increase of 8.5 MHz for communication from satellite to ships and an increase of 16.5 MHz from ships to satellite.

108. Unfortunately, we were not able to accommodate the request. The band 1710–1720 MHz is proposed as a downlink for the service, subject to power flux density limitations to be determined, but we have not been able to allocate spectrum to satisfy the up-link need. The band 1670–1690 MHz was investigated for this purpose; however, the government contends that it would not be possible to share that band with the meteorological services.

Comments are solicited as to where requirements should be satisfied; what conditions, if any may permit sharing in the band 1670–1690 MHz; and the extent to which technical innovations, e.g. multibeam techniques, use of linear TWT's (eliminating Babcock sparing) may reduce the need for frequencies.

SPECTRUM ABOVE 10.7 GHz

109. This portion of the radio spectrum should witness utilization by technologically novel telecommunications systems during the time period to be considered by the 1979 WARC. Our problem is to provide the frequency allocations which will permit the development and implementation of such systems. The keys to a solution of the problem are flexibility and order—the allocations must be flexible enough to permit experimentation, development, and implementation in the most appropriate portions of the spectrum, yet they must also be ordered enough to permit rational international and domestic planning for use of the spectrum.

110. In our previous notice in this proceeding we invited comments on a suggestion to accord the International Table of Allocations above 40 GHz with the domestic allocations as adopted in FCC Docket No. 19973. The received comments were divided as to the desirability of doing that. Those arguing against the suggestion repeated the concern expressed in Docket 19973 with respect to the sharing of space and terrestrial services; those arguing for the suggestion stated that experience in the lower frequency bands indicates that sharing is feasible within carefully selected criteria. We believe that suitable sharing criteria can be developed, and our proposed table includes the terrestrial services with corresponding space services where appropriate.

111. While the proposed table largely reflects the actions taken in Docket 19973, the issue of the manner in which allocations above 100 GHz should be proposed is still open. Some users feel that this spectrum should be left unallocated in order to insure maximum flexibility for the future; others feel that broad bands of spectrum should be allocated in a general manner—dividing the spectrum into 5 or 10 GHz bandwidths as the table reflects. Comments are invited on this aspect of the allocations problem.

112. Another issue of sharing has arisen in Commission discussions with the Office of Telecommunications Policy (OTP). The Government is planning to implement systems which use both Mobile-Satelite and Fixed-Satellite techniques; therefore, it is proposing simultaneous primary allocations to the Fixed-Satellite and Mobile-Satellite services in a number of frequency bands. The original Government proposals called for over 95 GHz of such allocations; they have since been reduced to call for about 40 GHz. We are concerned about problems which might arise with such shared allocations; the issue is fully addressed in the paragraph devoted to the Mobile-Satellite service.

113. The nonGovernment users of frequencies allocated to the Aeronautical services have requested exclusive allocations in the spectrum above 40 GHz, but we feel that the proposed allocations (shared with Maritime services) are more in keeping with our policy of maintaining flexibility. We have maintained the "(R)" designator in the table; however, we are not convinced that some, or all, of these bands cannot be shared with "(OR)" operations. The Government anticipates requirements in this portion of the spectrum. We invite technical analyses of the feasibility of such sharing and comments on the advantages, or disadvantages, to be obtained by a more general allocation. In this regard, we also desire comments on the relative merits associated with allocating the Maritime and Aeronautical services to the same band or to separate bands of spectrum.

114. Another problem area which has been defined in discussions with the OTP concerns the use of sensors in Space Research and Earth Exploration. Active sensors are essentially radar equipment and can operate in the Radiolocation bands without compatibility problems. Our proposed table identifies these operations by showing allocations for Space Research and Earth Exploration Satellite services with an "(ACTIVE)" designator. Perhaps a more convenient way to permit such operations in Radiolocation bands would be to define a "Space Radiolocation Station"; comments on the merits of each approach are invited. A more serious situation concerns the allocation of spectrum for use by passive sensors. These sensors measure surface characteristics and atmospheric distributions of such things as water vapor, air temperature, and pollutant gases; the data can then be used for monitoring and/or forecasting purposes which have a great pay-off in social and economic benefits. The problem arises because many of these measurements are frequency dependent; and simultaneous measurements at multiple frequencies are required. This problem is discussed in detail in the paragraph devoted to the Space Research and Earth Exploration Satellite services.

115. In the following paragraphs, we will discuss our proposed table on a service-by-service basis. Since utilization of this portion of the spectrum is largely developmental and there are few hard requirements defined at this time, the analysis cannot be as comprehensive as those given previously. Our chief concern has been to provide the flexibility neces-

[1] See section on Broadcasting-Satellite Service for further discussion.

sary to permit efficient development of the spectrum.

AMATEUR/AMATEUR SATELLITE

116. The Amateur SWG requested that the present allocations at 24–24.05 GHz and 24.05–24.25 GHz be retained and that the domestic allocations specified in Docket 19973 at 48–50, 71–76, 165–170, 240–250 and above 300 GHz be implemented internationally, because of the intensive interchange of ideas which takes place between amateurs in different countries. As our table shows, we are proposing no change to the existing allocations and also proposing additional allocations at 71–76, 165–170, and 240–250 GHz as in the Domestic Table. However, we are reserving the band at 48–50 GHz for Aeronautical and Maritime services.

BROADCASTING

117. The television broadcast SWG has requested that the present terrestrial allocation at 11.7–12.5 GHz be retained to permit development of new transmission systems. Although allocated internationally, terrestrial broadcasting in the 11.7–12.5 GHz band has not been introduced into the domestic U.S. table. In its preparation for the 1977 WARC on Broadcasting Satellite planning, the Commission has committed itself to the eventual removal of the TV remote pick up stations from the 11.7–12.2 GHz band, which is the only terrestrial service allocated (secondary) within the United States to this band. In the preparation for the Broadcasting Satellite WARC, it has become apparent that the U.S. approach for an evolutionary development of the 11.7–12.2 GHz band by the space services could be more easily achieved if the terrestrial services were suppressed in this band in ITU Region 2. The Commission's draft allocations table shows the suppression of the Fixed and Broadcasting Services in Region 2, and the relegation of the Mobile Service to secondary status, consistent with the current domestic table. The Commission invites comments regarding these actions, as well as the advisability of perhaps suppressing the Mobile Service as well. The Commission would propose retention of the Broadcasting service in the 12.2–12.5 GHz band in the international table in order to meet the requirement indicated by the Broadcast Service Working Group.

BROADCASTING-SATELLITE

118. The Broadcasting-Satellite SWG has requested the use of the band 12.2–12.5 GHz to be co-equally shared with the terrestrial broadcasting and fixed services. The sharing of frequencies between the Fixed- and the Broadcasting-Satellite Services is extremely difficult in the absence of artificial or man-made shielding or in the absence of earth station antennas with extremely low sidelobe levels. The 1977 broadcasting satellite WARC may allocate frequencies and orbital locations, so that development of the terrestrial service could be undertaken in the 11.7–12.5 GHz band shared in Region 1 between these services. The advisory Broadcasting-Satellite Service working group has estimated a broadcasting satellite market through the year 2,000 of about 1,250 TV channels for the United States and 1,200 TV channels for the rest (excluding the United States) of the Region 2 countries. Leaving aside the theoretical question of how many TV channels might be possible, the Commission would like to focus on the number of TV channels that would be used. The Commission believes that the actual requirements of Region 2 are far smaller than the market estimates submitted by the Broadcasting-Satellite Service working group. The relative demand between the Fixed- and the Broadcasting-Satellite Services in the 11.7–12.2 GHz band is not known. Considering 75 percent broadcasting satellite case, the 1977 JI/GC Working Group B report estimated that 55 satellite locations could be allocated to the fixed-satellite service and 44 satellite (945 TV channels equally divided between the community and the individual services) locations could be allocated to the Broadcasting-Satellite Service. There are approximately 50 countries in Region 2. On an average, each Region 2 country could be allocated 19 TV channels of Broadcasting-Satellite Service. In Europe, the current plan calls for the allocation of five broadcasting satellite TV channels to each country. The Stockholm plan had allocated four terrestrial TV broadcasting channels to each European country. With the current state-of-the-art for generating primary power, at least three, or possibly more, satellites would be required at each orbital location to cover the entire 11.7–12.2 GHz band. The total number of broadcasting satellites is thus, at least, 132. With present day estimates, the space segment, including the launch vehicles, would cost about $6.6 billion. If one percent of the present total 550 million population of Region 2 participate in this service and if the cost of each earth station antenna and the converter is $500 each, then an amount of $2.75 billion would be required to be invested terrestrially. In addition to the 11.7–12.2 GHz band, the 2.50–2.69 GHz band can also be used for the Broadcasting-Satellite Service. The orbital capacity of the latter band is $^{19}/_{50}$th of the capacity of 11.7–12.2 GHz band or about 360 TV channels. Taking into account all the factors, the Commission considers that 1300 broadcasting satellite channels, equally divided between the individual and community receptions, are adequate to satisfy the foreseeable requirements of Region 2 through the year 2000 and that no further frequency allocation to this service is necessary at this time. Therefore, the Commission is denying the request of the Broadcasting-Satellite Service working group for access to the 12.2–12.5 GHz and the 19.7–21.2 GHz bands. We are, however, proposing retention of the current allocations at 41–43 GHz and 84–86 GHz for future long-range developments in the Broadcasting-Satellite Service.

FIXED

119. Both the Common Carrier and Private Microwave users requested retention of present allocations and the alignment of the International Table with the Domestic Table adopted in Docket 19973. The Common Carriers are now making heavy use of the 11 GHz band for short routes in congested urban areas; they are planning to begin implementation of systems in the vicinity of 18, 22, 29, and 31 GHz in the very near future. They are also now planning to use the spectrum above 39 GHz for very local uses such as connection of apartment houses and office buildings. The Private Microwave users operate more than 700 stations for intra-city communications in the band 12.2–12.7 GHz and are projecting continued growth at an annual rate of 10 to 12 percent. Both types of users are already experiencing congestion difficulties in major urban areas. In addition, the Auxiliary Broadcast and Cable Ancillary working groups have expressed needs for small amounts of spectrum in the vicinity of 12, 17, 21, and 40 GHz.

120. As our table shows, we are proposing to maintain the present allocations below 40 GHz except for the band 36–37 GHz; and we are proposing to align the International Table as closely as possible with the Domestic Table for the spectrum above 40 GHz. The deviations from the present International and Domestic (40 GHz) Tables are in order to accommodate needs of the U.S. Government.

We are proposing to set aside frequencies at 55.5 GHz and 120 GHz for Industrial, Scientific, and Medical (ISM) operations.

MARITIME MOBILE/MARITIME MOBILE-SATELLITE

121. The users of the Maritime services requested that all of the allocations above 40 GHz be retained for future development and that sharing with the terrestrial services not be permitted.

As our table shows, we propose a flexible allocation, which provides terrestrial and space services above 40 GHz with the exception that the band 43–45 GHz is being re-allocated to satisfy U.S. Government requirements. We wish to receive information concerning the anticipated voice and data requirements and the estimated orbital capacity for each of the frequency bands, as well as information on the feasibility of terrestrial Maritime service operations above 40 GHz.

AERONAUTICAL MOBILE/AERONAUTICAL MOBILE-SATELLITE

122. The users in the Aeronautical Mobile (R) service raised the question of dividing the frequency bands now jointly allocated to the Aeronautical and Maritime services; they prefer exclusive allocations to the service. User Comments for Aviation in the range 1215 MHz–10.7 GHz also apply at this frequency range.

123. In this notice we invite comments on the merits of separate allocations to

Aeronautical and Maritime Mobile services; at present we believe that combined allocations provide more flexibility for the development of new communications systems. We are proposing worldwide adoption of the Domestic Table which includes combined allocations to both aeronautical and maritime space and terrestrial services with the exceptions of the band 190–200 GHz and of the band 43–45 GHz which is being reallocated to satisfy U.S. Government requirements. As in the previous service, information is desired concerning the anticipated voice and data channel requirements and the estimated orbital capacity for each of the frequency bands.

FIXED-SATELLITE SERVICE

124. The demand for Fixed Satellite services has grown dramatically over the past few years, and all signs point to a continuing growth in requirements. Within the United States, domestic satellites have demonstrated the economic and operational advantages of satellite communications for all types of communications services, and in particular for program distribution applications. The anticipated introduction of demand assignment techniques in the near future can also be expected to stimulate demand for service. Other countries have firm plans or are seriously considering the use of domestic satellite networks to upgrade their own internal telecommunications services. In addition, the unique operational requirements of the INTELSAT system and the high rate of growth of international satellite communications in general are imposing heavy demands on existing allocations. Additional demands on Fixed-Satellite spectrum are also being imposed by the introduction of specialized satellite networks, such as broadcasting-satellite systems, which require links in the Fixed-Satellite Service to support the overall telecommunications services provided through the system. Finally, while radio links in the Inter-Satellite Service to interconnect in-orbit satellite networks have not yet been implemented in practice, serious studies have been undertaken with the view toward future utilization in operational systems.

125. In view of the limited number of satellites that can be placed into the geostationary orbit by all countries which share access to this worldwide resource, it becomes apparent that the demands by the United States and other countries on the spectrum available are increasing more rapidly than is the state-of-the-art in satellite technology necessary to utilize higher frequency bands effectively and economically. Thus, even with the use of satellite design techniques that make the most efficient use of spectrum by all countries placing satellite systems into operation, additional allocations of spectrum to the Fixed-Satellite Service appear to be necessary. Otherwise, the growth of benefits from satellite communications may be prematurely foreclosed.

126. The Fixed Satellite SWG requested retention of the present allocations to the service. It also requested approximately 500 MHz additional in the spectrum between 10 and 15 GHz for each of the up and down bands, these additions being contiguous with existing allocations where feasible or being contained within the same frequency octave. A companion pair of 4 GHz total bandwidths each in the 20 GHz and 30 GHz regions of spectrum; and a narrow band allocation below 40 GHz in order to satisfy intersatellite links. Above 40 GHz, the SWG felt that requirements were not sufficiently firm to make allocations proposals; it stated that unallocated spectrum should be retained to allow for the accommodation of future developments. It also stated that existing allocations to the Fixed Satellite Service should be consistent with a percentage bandwidth concept for economic reasons.

127. The first request made by the SWG was accommodated through the proposal to have a continuous fixed-satellite down band from 10.7–11.7 GHz and a continuous up link from 12.75–13.25 GHz. It should be noted that these bands are for non-government fixed-satellite use limited to international operations. The bands of 11.7–12.2 GHz and 14–14.5 GHz have remained unchanged. The band 11.7–12.2 GHz is also shared with the Broadcasting-Satellite Service in Region 2 and the 12.75–13.25 GHz band is available for domestic as well as international operations. A closer scrutiny of these bands reveals a 250 MHz imbalance between the up and down links in these bands; this imbalance existed even prior to this proposed table, and may lie in part to the nature of the sharing in the bands involved. Comments are requested concerning the ability of these bands to satisfy the anticipated requirements under the constraints stated, and whether the imbalance of up and down bands in this area of the spectrum is likely to create any serious utilization problems.

128. The second request of the fixed-satellite advisory committee was for an expansion of the existing 20 and 30 GHz Fixed-Satellite bands to a pair of 4 GHz bands. In its negotiations with the government users, and in consideration of the requirements of other affected services, the Commission was unable to accommodate this request. Therefore, the existing bands of 17.7–21.2 GHz and 27.5–31 GHz remain unchanged, with the upper 1 GHz of each of these bands being reserved for exclusive government use. The remainder of each band is for exclusive non-government use.

129. The Commission has received a request for two frequency bands, 17.4–17.7 GHz and 22.7–23 GHz, to be allocated to the Intersatellite Service "to provide a medium capacity link for intersatellite link serving fixed satellites". This was the only request from non-government users indicating a requirement for an allocation in the Intersatellite Service. In making this request, there was no indication as to how these intersatellite bands would be used in conjunction with foreseeable systems, nor was there any discussion as to the reason for the preference for these two bands. Recognizing that the water vapor line (rest frequency 22.235 GHz) is expected to give more attenuation in the atmosphere at 23 GHz than at 17 GHz, the Commission is proposing to provide for an Intersatellite Service band from 22.7–23 GHz, even though the requirement for this allocation is less compelling than would have been desired. This band will also be shared terrestrially with the Fixed and Mobile Services.

130. COMSAT and COMSAT General in their comments to the Second Notice of Inquiry in this Docket and the advisory fixed-satellite service working group have requested the frequency bands 40–43 GHz, 48–51 GHz, 92–95 GHz, 102–106 GHz, 140–142 GHz and 150–156 GHz be allocated to the fixed-satellite service on an exclusive basis. COMSAT has additionally requested 95–96 GHz and 142–144 GHz bands on an exclusive basis. COMSAT and COMSAT General in their comments to the Second Notice of Inquiry in this Docket, have requested the frequency bands 138–140 GHz, 220–230 GHz and 265–275 GHz on an exclusive basis. In their comments to the Second Notice of Inquiry in this Docket, AT&T, AAR, Motorola, ARINC (except the allocations for the mobile services) agreed that generally the international table of frequency allocations should be aligned with the United States domestic allocations. GTESC, in the comments to the Second Notice of Inquiry in this Docket, doubts the consistency of domestic allocations with the letter and spirit of the allocation developed at Geneva in 1971 WARC–ST. GTESC urges the Commission to re-examine allocations at 40–41 GHz, 50–51 GHz, 92–95 GHz, 102–105 GHz, 140–142 GHz, 150–152 GHz, 220–230 GHz and 265–275 GHz bands. The advisory fixed-satellite service working group requested revisions of the 40–51 GHz band "to provide a pair of bands of about 6 percent," revisions of the 92–106 GHz band "to provide a pair of bands of about 4 percent" and revisions of 140–170 GHz band "to provide a pair of bands of about 4 percent."

131. COMSAT and COMSAT General have repeatedly raised the question of feasibility of sharing above 40 GHz band between the fixed-satellite and the terrestrial (fixed, mobile) services. The question can best be answered by unbiased technical studies. It has been shown both theoretically and experimentally that sharing is possible at the lower frequencies such at 6/4 GHz. The rational approach would be to conduct theoretical studies on the subject. Although this subject has been in the forefront of the minds of technical people since 1972, no one in the United States has yet started, to the Commission's knowledge, studies [8] on the subject. The Commission believes that the fixed and

[8] CCIR Question 53/1: Systems for telecommunication, determination and other purposes, operating in the electromagnetic spectrum above 40 GHz, particularly the highest frequency region of radio waves, as well as in the infrared and visible light regions.

the fixed-satellite services can share frequency bands above 40 GHz and that allocation of different services to a shared frequency band would encourage studies on different aspects of sharing. Such studies would show the sharing criteria necessary.

132. COMSAT has given a long dissertation on the percentage of spectrum allocated to each service. If there is a reasonable channel requirement for the fixed-satellite service, every attempt has to be made to fulfill that requirement. Percentage spectrum is the end result of the allocation and is not a criteria for the frequency allocation. One basic criteria is the equivalent voice channel requirement of the fixed-satellite service. Sound forecasting of channel requirements is needed to determine the frequency requirements for the fixed-satellite service. The Commission has noted that forecasts of international frequency requirements, over the past years, have been greatly in excess of actual channel usage. The second criteria is the orbital capacity in each frequency band. The advisory JI/GC working group B of the 1977 broadcasting satellite WARC has stated (Docket 20468) that an orbital separation of less than 1° is possible in the 11.7–12.2 GHz band when using some general principles. Assuming the orbital capacity to be equally divided between the broadcasting-satellite and the fixed-satellite services in the 11.7–12.2 GHz band, altogether 180 fixed-satellites could be accommodated in the geostationary orbit. The principles enunciated by the JI/GC Group B are broad. If they are good for the fixed- and the broadcasting-satellites in the 11.7–12.2 GHz band, the Commission believes that these principles should then be applicable to all other frequency bands of the fixed- and the broadcasting-satellite services to improve the efficiency of the orbit-spectrum use.

133. The Commission has domestically allocated 11.9 percent of the frequency between 40 and 275 GHz to the fixed-satellite service as compared to 10 percent requested by the advisory fixed-satellite service working group. Above 40 GHz, two 1 GHz wide, one 2 GHz wide and one 10 GHz wide band have been allocated to the fixed-satellite service excluding the allocation of 92–93 GHz, 102–103 GHz, 140–141 GHz, 150–151 GHz bands agreed to earlier in 1972 for the exclusive use of Government agencies. Using the JI/GC working group approach, the total orbital capacity of the domestic fixed-satellite service, above 40 GHz, is $14\times360\times2=10080$ satellites each having a 0.5 GHz bandwidth. The total cost of the satellites and the launch vehicles, at present estimates, would be approximately $504 billion. The Commission has considerable difficulty in believing that the foreseeable requirements of the fixed-satellite service could be such as to need 10080 satellites or that mankind could invest such a staggering amount of money on this service alone. There are a number of unused transponders in the 6/4 GHz United States domestic satellite service. The launch of the third AT&T satellite has been delayed. It appears that the actual demand of the domestic satellite service is considerably lower than was forecast by the industry. Some satellite development work is underway between 40 and 80 GHz. The Commission cannot predict the pace of the technological advances, but the Commission would be surprised if a significant portion of the spectrum above 40 GHz would be used for the fixed-satellite service in this century.

134. The question of providing "larger contiguous" bandwidth has been raised. The Commission has domestically allocated (Docket 19973) 1, 2 and 10 GHz contiguous bandwidths for the fixed-satellite service above 40 GHz band. In general, the satellite transmitter power increases with increasing frequency. It has been estimated [*] that at 42 GHz and 85 GHz bands, satellite transmitter powers of 1700 W and 43 kW, respectively, are needed for a bandwidth of 40 and 44 MHz. The fixed-satellite service working group has, for example, requested a frequency band of 92–96 GHz. The required satellite power, then, appears to be about $43\text{x}4000=3900$ kW for a 4 GHz wide band. The Commission would need rational technical discussion on the optimum and feasible satellite bandwidth, the required amount of satellite transmitter power, the capability of the satellite to provide the required power before making changes on the allocated contiguous bandwidth.

135. There are many uncertainties and unknowns in the frequency bands above 40 GHz. The fixed-satellite service working group stated that "Above 40 GHz, the committee felt that requirements were not sufficiently firm to make allocation proposals." The Commission recently issued a Report and Order (Docket No. 19973) on the domestic allocations above 40 GHz after a lengthy proceeding. The Commission is of the opinion that, in general, the international tables shall be aligned, for the present, with the domestic table of allocations to give protection to the domestic table. The Commission, for the sake of expediency in developing the allocations table, as well as recognizing the uncertainties surrounding the use of the bands above 40 GHz, has proposed the deletion of all direction indicators for the Mobile-Satellite and Fixed-Satellite Services above 40 GHz. The Commission invites comments on the need for direction indicators in these bands and the need, if any, for the pairing of frequency bands for these services.

MOBILE-SATELLITE

136. The Mobile-Satellite Service is defined in the international Radio Regulations as a radiocommunication service:

> Between mobile earth stations and one or more space stations; or between space stations used by this service;
>
> Or between mobile earth stations by means of one or more space stations;
>
> And if the system so requires, for connection between these space stations and one or more earth stations at specified fixed points.

137. Operation in the Mobile-Satellite Service will invariably involve the use of mobile earth stations with, or through, space stations. Inherent with this type of service are difficult and complex questions of coordination with terrestrial services as well as with stations in the Fixed-Satellite Service if these services share the band with the Mobile-Satellite Service.

138. In the Commission's seeking out of non-government requirements in preparation for the 1979 General WARC, no requirements surfaced for the use of this service. All proposed allocations, therefore, which appear in the table attached to this Notice of Inquiry are the result of requirements submitted by possible government users. These uses include the utilization of land, sea and air mobile earth stations, with antenna sizes as small as would be required for backpacked field use. It has been proposed in all cases above 10.7 GHz that the Mobile-Satellite Service share co-equally with the Fixed-Satellite Service. In addition, above 40 GHz, additional sharing with terrestrial Fixed and Mobile is proposed in virtually all of the Mobile-Satellite allocations. Is sharing of Mobile and Fixed-Satellite Services frequency dependent? If not, could commercial fixed-satellite frequencies, such as 6/4 and 14/12 GHz bands, be shared with mobile satellites?

139. The nature of the Mobile-Satellite Service requires the use of relatively small mobile earth stations, with the inherently high satellite e.i.r.p.'s associated with small earth terminals. Bearing in mind the generally high sensitivity of Fixed-Satellite earth stations and terrestrial Fixed Service receivers, the Commission solicits comments as to the feasibility of sharing between the Mobile-Satellite Service and these other services, and, if sharing is deemed feasible, the best approach by which such sharing could be accomplished (e.g., satellite PFD limits, coordination procedures, etc.). The Commission is also extremely interested in obtaining comments as to the impact of the Mobile-Satellite Service on orbit/spectrum utilization. Such information is vital to the determination of actual spectrum requirements in light of stated system requirements, and also for the evaluation of impact on other services sharing the geostationary orbit.

140. Below is a listing of the spectrum requirements initially put forth by the various government users for the Mobile-Satellite Service above 10.7 GHz. After extensive examination the proposed allocations table resulted. Recognizing the difficulty for the public sector to evaluate the requirements of the government users, the Commission nonetheless requests comments as to how such a large request (37.5 GHz total bandwidth) for Mobile-Satellite allocations is likely to affect the non-government use of the spectrum above 10.7 GHz.

141. Following is a listing of the initial government requests for allocations to

[*] CCIR USSG 10/11B BC/839 "Broadcasting Satellite Service, preferred system characteristics", 19 January 1976.

the Mobile-Satellite Service above 10.7 GHz.

GHz			
14.0–14.5		92	– 95
17.9–19.7		102	–105
19.9–21.2		140	–142
27.5–31		151	–170
36 –41		201.5–225	
43 –45		240	–250
50.4–51.4		266	–275
72 –84			

Total—96.6 GHz, which does not include special allocations to the Maritime Mobile-Satellite or the Aeronautical Mobile-Satellite Services. The table as it appears in this Notice of Inquiry includes a total bandwidth of 37.5 GHz allocated to the Mobile-Satellite Service.

142. As an adjunct to the table of allocations which the United States would put forth at the WARC, it is proposed that there would also be a memorandum of national understanding between the Commission and the Government users that the two Mobile-Satellite bands 40–41 GHz and 43–45 GHz would be for exclusive government use.

Space Research/Earth Exploration Satellite

143. The U.S. Government proposed a number of allocations for the Space Research and Earth Exploration Satellite Services [10] in order to permit remote sensor operations. Active sensors are essentially radars and are compatible with operations in radiolocation bands; accordingly, their requirements for spectrum can be easily accommodated. Passive sensors are used to: Measure soil moisture content; detect snow and measure extent, depth, and water content; measure salinity of estuarine and sea water; measure sea state from which wind speed and direction can be inferred; detect and measure oil slicks; measure ocean surface temperature; detect clouds and measure water content; measure rain rates; measure atmospheric water vapor; measure temperature profiles of the atmosphere; and detect and measure pollutant gasses in the atmosphere. Important applications which need data from these meaurements include improved agricultural production and distribution, water resources management, flood forecast and control, improved ship routing, oil and mineral exploration, and monitoring of environmental pollution. A NASA economic analyses forecast multibillion dollar benefits from these applications; social benefits include conservation of resources and protection of life and property. The measurements are frequently dependent, critically so for those which depend on molecular resonance frequencies of water vapor, oxygen, and pollutant gasses; and simultaneous measurements at multiple frequencies are required in order to eliminate competing effects and to provide suitable measurement dynamic ranges.

144. The requirements for such passive sensor operations in this portion of the spectrum are summarized in the following list.

Frequency Band GHz	*Measurement/Use*
10.6–10.95	Sea state, wind and ice mapping; snow mapping (low Earth-orbiting satellite)—weather forecasting, ocean transportation routing and severe storm tracking; snow runoff monitoring for hydroelectric power, irrigation, and reservoir and flood management.
15.35–15.4	Same as previous band, but added accuracy and sensitivity. Also, water vapor in the lower atmosphere for weather forecasting and pollutant movement.
17.7–17.9	Same as previous band, except water vapor in the mid-atmosphere.
19.7–19.9	Same as previous band, except water vapor in the higher atmosphere. Also, rain mapping (low rain rates) for weather forecasting, irrigation, reservoir, flood and hydroelectric power management.
22.1–22.5	High altitude water vapor global mapping—weather forecasting and climatology.
23.6–24	Mid-altitude water vapor mapping—weather forecasting and pollutant movement monitoring.
31.3–31.8	Snow/ice mapping—more sensitive to ice mapping for climatology and arctic ship routing.
36–37	Rain mapping (high rain rates) irrigation, reservoir, flood and hydroelectric power management.
50–50.4, 51.4–59, and 64–66.	Atmospheric temperature profiling—weather forecasting, long-term climatology, drought and other hazardous short-term climatology warnings.
86–89	Snow/ice mapping (high resolution) — ocean transportation routing, climatology; snow runoff for irrigation, reservoir, flood and hydroelectric power management.
101–102, 105–116, 150–151, 174.5–176.5, 200–201.5, 250–252, 275–277.	Pollution monitoring—nitric oxides and other pollutants for environmental monitoring.
225–230	Pollution monitoring—carbon monoxide and ozone depletion (aerosols, SST, etc.) measurements for environmental monitoring.

145. As our table shows, these services are included in the bands required which are otherwise proposed for passive services or are domestically allocated for government use. The table also shows these services included in the bands 22.21–22.5, 54.25–58.2, and 174.5–176.5 GHz where non-government proposals would require that they share with active services. In addition, there are requirements for these services in the bands 10.6–10.95, 17.7–17.9, 19.7–19.9, 50.0–50.4, 100–101, 116–130, 150–151, 200–201.5, 225–230, 250–252 and 275–277 GHz; sharing with active services would also be necessary in these bands. The bands 10.6–10.95, 15.35–15.4, 17.7–17.9, 19.7–19.9, 31.3–31.8, 36–37, and 86–92 GHz would be used for multifrequency measurements about the water vapor line at 22.235 GHz. Since there is a large potential pay-off in both economic and social benefits, we wish to accommodate the spectrum requirements for remote sensing operations; comments on the desirability and feasibility of doing so through sharing arrangement or through exclusive allocations are desired.

146. Another problem arises in the bands 12.75–13.25, 14.0–14.3, and 14.4–14.5 GHz where we are considering shared allocations between the Fixed Satellite service and the Space Research service and in the band 17.9–18.7 GHz where we are considering shared allocations between the Fixed Satellite service and the Earth Exploration Satellite service; the Government desires that the Space Research and Earth Exploration Satellite services be primary in the respective bands. We invite comments on the feasibility of such arrangements, particularly with regard to providing protection to the Fixed Satellite links. In addition, a Footnote is proposed for the band 17.90 and 17.95 GHz which would provide readout to small earth terminals with no power flux density limitation subject to administration agreements; comments are requested on this proposal.

Radio Astronomy Service

147. This service is devoted primarily to the research, study, and investigation of celestial bodies and interstellar gasses and plasmas, and of their magnitudes, motions and constitution. Each such body, in accordance with its chemical composition, radiates electromagnetic energy at various frequencies throughout the radio spectrum. A study of these frequencies, or line spectra, can lead to an intelligent deduction concerning the physical make-up of these extra-terrestrial radio sources. If interference exceeds a certain level, then radio-astronomical observations are rendered untrustworthy. With this in mind, it is not feasible for this service to share an allocated band with an active service within line of sight. Moreover, it is not recommended that this service be located in bands adjacent to any service that could transmit air- or space-to-ground communications directly or indirectly into radio astronomy antennas at harmful interference levels. In the past twenty-five years many scientific discoveries have been made through radio astronomy observations. The recent discovery of pulsars, celestial bodies consisting of densely packed neutrons, lends support and contributes to a further understanding of the nuclear theory, the relativistic theory of gravitation, and the theory of stellar evolution.

148. In addition to advancing our knowledge about the Universe the science

[10] See for example, Final Technical Report Frequency Allocation Requirements for Earth Observation Sensors; Contract No. NASA 5–22032, June 1975; National Scientific Laboratories.

of radio astronomy is making important contributions to mankind on a practical level. Some areas in which major advances are taking place at present using radioastronomical techniques and methods are:

a. The study of thermography of the body;
b. The detection of breast cancer;
c. The detection of forest fires by their microwave radiation;
d. The development of radio sextants for marine navigation; and
e. The forecasting of earthquakes.

149. The radio astronomers have requested retention of the allocations to that service in the bands 15.35–15.40, 23.6–24.0, 31.3–31.5, and 86.0–92.0. They have also requested the following new allocations: 22.21–22.26 GHz for observation of the water molecular line; 31.5–31.8 GHz in order to broaden the allocation at 31.3–31.5 GHz and thereby permit faster observations; 105–116 GHz for observation of several carbon monoxide molecular lines which are now considered to provide the most beneficial information in the radio spectrum; 182–185 GHz for observation of an important transition of H_2O; 217–221 GHz in order to protect observations of the carbon monoxide lines at 219.5 and 220.4 GHz; 229–231 GHz in order to protect observations of the carbon monoxide line at 230.5 GHz and 261–272.5 GHz in order to observe a number of important spectral lines. The astronomers stated that they could relinquish the spectrum in the 130–140 GHz band in exchange for 105–116 GHz because it contains no important spectral lines and was previously selected for continuum observations which are no longer required. Allocations requests for the bands 15.3–15.35 GHz and 15.4–15.44 GHz could not be accommodated due to pressing requirements of other services and sharing incompatibilities.

150. The important requirement at 105–116 GHz was accommodated at the expense of deleting spectrum allocated to the intersatellite service. The requirements at 31.5–31.8 GHz and 182–185 GHz were easily accommodated because these bands were already allocated for use by passive sensors. However, the bands 22.21–22.6, 217–221, and 229–230 GHz are proposed for use by active sensors. The proposed table shows the radio astronomy service included in these bands, and we desire specific comments on this allocation arrangement. We are proposing to protect the observations at the spectral lines above 261 GHz by means of a Footnote.

151. It must be emphasized that the proposed Table is subject to modifications based upon additional requirements, government and nongovernment, which may be identified, upon comments received from the public, and upon the results of any spectrum studies to be performed. Those modifications will be reflected in further Notices of Inquiry to be issued as conference preparatory activity continues.

152. Although the primary focus of the 1979 WARC will be upon the Frequency Allocations Table (Article 5 of the International Radio Regulations) it will consider other aspects of the Radio Regulations as well. In the time since the previous notices, the items discussed in the following paragraphs have come to our attention; we also desire to receive public comment on these.

153. The Diplomatic Conference on Humanitarian Law, Geneva 1976, considered the use of radiocommunications for announcing and identifying medical transports protected under the Geneva Convention of 1949. It recognized that the designation and use of radio frequencies (including distress frequencies), the operating procedures in the Mobile Service, the distress, alarm, urgency and safety signals, and the order of priority of communications in the Mobile Service are governed by the International Radio Regulations. In order to provide for the vital communications of protected medical transports, that Conference requested that the 1979 WARC establish the procedures for notifying common radio frequencies and for international recognition of an appropriate priority signal. In Appendix 2 we have attached the text proposed by the Diplomatic Conference for inclusion into the Annex to Additional Protocol I of the Geneva Convention. This proposal will affect Articles 36, 37, 37A, and 44 of the Radio Regulations.

154. Increasingly intensive use is being made of radio-relay systems for the transmission of telephony, television, and digital systems. According to the present regulations (Article 12, Appendix 3), the frequency tolerance for radio transmitters is expressed in terms of a percentage of carrier frequency. The total frequency variation permitted increases in direct proportion to the emitted frequency and could eventually exceed the information bandwith being conveyed by the system. Although there is no general consensus as to the most appropriate method for dealing with this problem, we submit the following options for public consideration:

(a) Continue with a general tolerance (as a percentage of carrier frequency) as in the present Radio Regulations;
(b) Apply an absolute tolerance to each frequency band in the Radio Regulations; and
(c) Apply a percentage tolerance related to the authorized or necessary bandwidth.

Conclusion

155. As we have previously indicated in this proceeding, all participants should keep in mind the importance of the 1979 WARC results. Based upon past experience, decisions reached at this conference can be expected to provide the basis for international radio regulation policy for most of the remainder of this century. It is of the utmost importance to develop U.S. proposals which effectively promote that combination of telecommunication uses which offers the maximum social and economic contribution to the national welfare and which also contain the flexibility necessary to accommodate important new applications of this dynamic technology as well as the unique requirements of our international partners in the ITU. It must be recognized that the proposal in Appendix 1 is for the international Table of Frequency Allocations, and that the national implementation of such a table will require extensive U.S. national consideration.

156. Comments bearing on the proposed allocations table, the proposed draft protocol concerning medical transports, frequency tolerances for radio-relay equipment, and any other matters relevant to preparation for the 1979 WARC are hereby sought from all interested United States individuals, parties, or groups of parties which may exist.

157. Pursuant to applicable procedures set forth in section 1.415 of the Commission's Rules, interested persons may file comments on or before January 31, 1977, and reply comments on or before February 21, 1977. All relevant and timely comments and reply comments, along with any pertinent information which the Commission may have available, will be considered. When commenting, it should be borne in mind that this effort is directed toward international allocations and not domestic issues. The U.S. wants to achieve maximum flexibility in international allocations proposals.

158. Although section 1.419 of the Commission's Rules required that an original and fourteen copies of all statements, briefs or comments be filed in response to a notice, the Commission's conference preparatory organization necessitates the filing of an original and nineteen copies. All responses received will be available for public inspection during regular business hours in the Commission's Public Reference Room at its Headquarters in Washington, D.C.

159. This notice is issued pursuant to the authority set forth in section 4(i) of the Communications Act of 1934, as amended 47 U.S.C. 154(i).

Federal Communications Commission,[10]
Vincent J. Mullins,
Secretary.

Appendix 1

Proposed International Table of Frequency Allocations

Method of Presentation

1. Numbers shown are the international Radio Regulation numbers;
2. Underlining indicates new text;
3. If a service is in all Capitals, it is a primary service (e.g. MOBILE);
4. If a service has a Capital as the first letter, and the remainder in lower case, it is a secondary service (e.g. Mobile);
5. Slant bars before and after service indicate a permitted service (e.g. /Mobile/);
6. ADD means an addition to the current provisions;
7. Dashes through the text (e.g., Space) indicate existing text which is being deleted;
8. MOD means a modification of the current provisions;
9. SUP means to suppress the current provisions;
10. NOC means we are proposing that the current provisions not be changed;
11. In view of the action taken by the Final Acts of the 1971 Space Conference all frequencies should be expressed in hertz instead of cycles per second;
12. The absence of MOD, SUP OR NOC against a given Radio Regulation means that no proposal is being made in respect to that provision.

[10] Concurring statement of Commissioner Robert E. Lee filed as part of the original.

1.

TABLE OF ALLOCATIONS

kHz

Region 1	* *	Region 2	* *	Region 3
Below 10		(Not allocated) 157		
REASON: No allocations to services proposed. NOC 157 REASON: There is a continuing need for this condition in the event that frequencies below 10 kHz are used for special national purposes.				
10-14		RADIONAVIGATION ~~Radiolocation~~		
Reason: There is continuing and expanded use of this frequency band for worldwide radio navigational systems (Omega) for maritime and aeronautical aids. Radiolocation is being deleted to protect radfonavigation ~~systems~~, and to preclude the entry of incompatible systems in the future.				
14-19.95		FIXED MARITIME MOBILE 158 159		
19.95-20.05		STANDARD FREQUENCY 160 159		
20.05-70		FIXED MARITIME MOBILE 158 159 161		

2.

kHz

Region 1	* *	Region 2	* *	Region 3
70-72 RADIONAVIGATION 162 161		70-90 FIXED MARITIME MOBILE 158 MARITIME RADIONAVIGATION 162 Radiolocation		70-90 FIXED MARITIME MOBILE 158 RADIONAVIGATION 162
72-84 FIXED MARITIME MOBILE 158 RADIONAVIGATION 162 161 163				
84-86 RADIONAVIGATION 162 163				
86-90 FIXED RADIONAVIGATION 162 MARITIME MOBILE 158 163		164		165

Reason: Operational requirements remain constant.

3.

kHz

Region 1	*	Region 2	*	Region 3
90-110	*	90-110	*	90-110
Fixed	*		*	
~~FIXED~~	*	RADIONAVIGATION	*	~~FIXED~~
~~MARITIME MOBILE 158~~	*	Fixed	*	~~MARITIME MOBILE 158~~
RADIONAVIGATION	*	Maritime Mobile 158	*	RADIONAVIGATION
Maritime Mobile 158	*		*	Fixed
	*		*	Maritime Mobile 158
	*		*	
	*		*	
163 166 167	*	166 167	*	166 167

REASON: Domestically, this band is presently available to the radionavigation service only. Internationally, it is contemplated that this band will become primarily allocated to the radionavigation service for worldwide long distance radionavigation systems.

NOC 166

REASON: Applicable to the contemplated use of this band for worldwide radionavigation systems. Affords additional protection.

4.

kHz

Region 1	Region 2	Region 3
110-112	110-130	110-130
FIXED MARITIME MOBILE RADIONAVIGATION 162 163 167 ~~168~~	FIXED MARITIME MOBILE MARITIME RADIONAVIGATION 162 Radiolocation	FIXED MARITIME MOBILE RADIONAVIGATION 162
112-115		
RADIONAVIGATION 162 163		
115-126		
FIXED MARITIME MOBILE RADIONAVIGATION 162 163 167 ~~168~~ 169		
126-129		
RADIONAVIGATION 162 163		
129-130		
FIXED MARITIME MOBILE RADIONAVIGATION 162 163 167 168	164 167 ~~168~~	167 ~~168~~ 170

SUP 168
Reason: No longer any requirement.

REASON: Domestically, this band is presently allocated to the fixed service in Alaska, the international public fixed, maritime mobile and radiolocation services. No specific requirements or recommendations to retain these allocations, other than for the radiolocation service, have been received. There is a need for the radiolocation allocation on a primary basis for geophysical, maritime, and surveying radiolocation functions.

SUP 168

REASON: Service has been deleted.

6.

kHz

Region 1	Region 2	Region 3
130-150 MARITIME MOBILE 172 Fixed 163 167 173	130-150 FIXED MARITIME MOBILE 167	
150-160 MARITIME MOBILE 167 174 BROADCASTING 175	150-160 FIXED MARITIME MOBILE 167	
160-~~255~~ 190 ~~BROADCASTING~~ AMATEUR 176	160-200 190 ~~FIXED~~ AMATEUR 179	160-190 ~~FIXED~~ ~~Aeronautical radionavigation~~ AMATEUR
190-200 BROADCASTING 176	190-200 FIXED 179	190-200 FIXED Aeronautical Radionavigatic
200-255 BROADCASTING 176	200-285 275 AERONAUTICAL RADIONAVIGATION Aeronautical mobile	
255-285 275 MARITIME MOBILE 174 BROADCASTING AERONAUTICAL RADIONAVIGATION 176 177 178		

REASON: 160-190 kHz--allocated domestically to the fixed (in Alaska) and international fixed public services. No specific Non-Gov't requirements or recommendations for the continuation of this allocation were submitted. Reallocation to the amateur radio service primarily for low frequency experimentation purposes.

(CONTINUED)

7.

200-285 275 kHz--There is a continuing need for services in this band for aeronautical radionavigation and aeronautical mobile purposes.

kHz

Region 1	* *	Region 2	* *	Region 3
275-285		275-285		
MARITIME MOBILE 174 BROADCASTING AERONAUTICAL RADIONAVIGATION Maritime radionavigation (radiobeacons) 176 177 178		AERONAUTICAL RADIONAVIGATION Aeronautical mobile Maritime radionavigation (radiobeacons)		

Reason: To support requirements for maritime radiobeacons.

8.

kHz

Region 1	*	Region 2	*	Region 3
285-315		MARITIME RADIONAVIGATION (radiobeacons) Aeronautical radionavigation		

REASON: There is a continuing need to utilize this band for radionavigation (radiobeacons).

315-325 AERONAUTICAL RADIONAVIGATION 180	*	315-325 MARITIME RADIONAVIGATION (radiobeacons) Aeronautical radionavigation		

Reason: There is a continuing need to utilize this band for radionavigation (radiobeacons).

325-405 335		Maritime radionavigation (radiobeacons) AERONAUTICAL RADIONAVIGATION Aeronautical mobile 181		

Reason: There is a continuing need to utilize this band for aeronautical radionavigation and aeronautical mobile, and to support requirements for maritime radionavigation beacons.

335-405		AERONAUTICAL RADIONAVIGATION Aeronautical mobile 181		

Reason: There is a continuing need to utilize this band for aeronautical radionavigation and aeronautical mobile services.

9.

kHz

Region 1	Region 2	Region 3
405-415 MOBILE except aeronautical mobile AERONAUTICAL RADIONAVIGATION MARITIME RADIONAVIGATION (radio direction-finding) 182 183 184	405-415 MARITIME RADIONAVIGATION (radio direction finding) Aeronautical radionavigation Aeronautical mobile 182	405-415 RADIONAVIGATION Aeronautical mobile 182

REASON: There is a continuing need for the services specified above in this band.

NOC 182

REASON: There is a continuing need to provide the maritime radionavigation (radio direction-finding) service with protection from interference from other services utilizing this band.

10.

kHz

Region 1	* *	Region 2	* *	Region 3
415-490		MARITIME MOBILE 186 / Aeronautical radionavigation / MOD 185 ~~186~~		

REASON: There is a continuing need by the maritime mobile service to utilize this band for telegraph communications over short and medium distances. There is a future need for an allocation in this band to the aeronautical radionavigation service on a worldwide sharing basis.

MOD 185 In the European Maritime Area, subject to the conditions specified in the Final Acts of the European Maritime Conference (Copenhagen 1948), and any subsequent revision of that agreement, the administrations concerned may keep in the band 415-485 ~~kc/s~~ kHz and 515-525 ~~kc/s~~ kHz such of the following broadcasting stations as will not cause harmful interference to the maritime mobile or aeronautical radionavigation services: Hamar, Innsbruck, Oestersund, Oulu.

REASON: To conform to the new entry in this band.

490-510		MOBILE (distress and calling) 187		

REASON: There is a continuing need to maintain this band for international distress traffic and calling purposes.

NOC 187

REASON: Same as indicated above.

11.

kHz

Region 1	Region 2	Region 3
510-525 MARITIME MOBILE 186 188A ~~Aeronautical radionavigation~~ 188 /Aeronautical radionavigation/188 185	510-525 ~~MOBILE~~ /Aeronautical radionavigation/ 188 MARITIME MOBILE 186 188A	510-525 MARITIME MOBILE 186 188A Aeronautical mobile Land mobile /Aeronautical radionavigation/188 189

REASON: This band is not normally available for non-Government use except that the frequency 512 kHz is available under certain circumstances. However, there is a future need to utilize this band for worldwide aeronautical radionavigation purposes subject to no interference being caused to maritime mobile services which also have a future need to utilize this band for telegraph communications over short and medium distances. Mobile allocation deleted and maritime mobile allocation (and appropriate footnote) inserted to conform to allocation in other regions.

NOC 188

REASON: To retain priority for the maritime mobile service in this band on a worldwide basis.

ADD 188A The frequency 512 kHz is used as prescribed by Nos. 1123 and 1125 through 1129.

Reason: To indicate 512 kHz is used in accordance with provisions of Article 32.

12.

kHz

Region 1	Region 2	Region 3
525-535	525-535	525-535
BROADCASTING	MOBILE ~~Broadcasting-191~~ ~~Aeronautical radionavigation-188~~ BROADCASTING	MOBILE ~~Broadcasting~~ BROADCASTING
190		

REASON: Population growth, shifts in population, new communities and other factors are sufficient to warrant some expansion of the medium frequency broadcasting band to meet future requirements.

SUP 191

REASON: No longer required.

535-1605

BROADCASTING

REASON: There is a continuing need to provide existing and expanded broadcasting services to the general public.

13.

kHz

Region 1	Region 2	Region 3
1605-~~2000~~ 1725 FIXED MOBILE except aeronautical mobile 192 193 194 195 195A	1605-~~1800~~ 1615 ~~FIXED~~ MOBILE AERONAUTICAL RADIONAVIGATION ~~Radiolocation~~ BROADCASTING	1605-~~1800~~ 1725 FIXED MOBILE 197
	1615-1750 MOBILE AERONAUTICAL RADIONAVIGATION Radiolocation LAND MOBILE FIXED	
1725-1800 FIXED MOBILE except aeronautical mobile AMATEUR 192 193 194 ~~195~~ 195A	1750-1800 FIXED MOBILE AERONAUTICAL RADIONAVIGATION Radiolocation AMATEUR	1725-1800 FIXED MOBILE AMATEUR 197
1800-1900 ~~FIXED~~ ~~MOBILE except aeronautical mobile~~ AMATEUR 192 193 194 ~~195~~ 195A		

14.

kHz

Region 1	Region 2	Region 3
1900-2000 FIXED MOBILE except aeronautical mobile Radiolocation	1800-~~2000~~ 1900	AMATEUR ~~FIXED~~ ~~MOBILE except aeronautical mobile~~ ~~RADIONAVIGATION~~ ~~198~~
	1900-2000	~~AMATEUR~~ FIXED MOBILE except aeronautical mobile ~~RADIONAVIGATION~~ Radiolocation
192 193 194 195 195A		MOD 198

REASON: Domestically, this band is presently allocated to a number of services including aeronautical fixed, aeronautical radionavigation, fixed (in Alaska), industrial, international fixed public, maritime mobile, public safety, radiolocation, broadcast remote pickup (base and mobile), radionavigation land, disaster and amateur. Radionavigation (Loran-A) systems may be phased out by 1980. Therefore, the allocation to radionavigation has been deleted. In view of the future requirements for the use of this band involving a number of services and the resulting incompatibilities, the band has been allocated as indicated above for the following purposes:

1605-1615: Population growth, shifts in population, new communities and other factors are sufficient to warrant some expansion of the medium frequency broadcasting band to meet future requirements on an exclusive basis. This reallocation in addition to the reallocation of the band 525-535 kHz will provide two new medium frequency channels contiguous to the existing medium frequency brodcasting band which is being retained for that use.

15.

1615-1725: There is a continuing and future need for accommodations in this band for land mobile and fixed services, which include industrial, public safety, broadcast remote pickup (base and mobile), disaster, and other services. Radiolocation services are also included on a secondary basis to provide for geophysical, maritime, and surveying radiolocation functions.

1725-1800*: Short to medium range communications can be accomplished by the amateur service in this and the following band with less sharing and resulting incompatibilities presently experienced by this service in the existing band. Radiolocation is included on a secondary basis to provide for radiolocation functions as indicated above.

1800-1900*: Same as the preceding paragraph except the allocation to the amateur service is on an exclusive basis.

*It can not be readily determined whether or not worldwide allocation of these bands to the amateur service is practicable due to the lack of knowledge regarding spectrum requirements in other regions.

1900-2000: A variety of mobile (except aeronautical mobile) and fixed services can share this band on a co-equal primary basis with the radiolocation service utilizing this band on a secondary basis to accommodate contemplated future requirements of that service.

MOD 198

~~In Region 2 the Loran system has priority. Other services to which the band is allocated may use any frequency in this band provided that they do not cause harmful interference to the Loran system.~~

In Region 3 the Loran system in any particular area operates either on 1850 or 1950 kHz, the bands occupied being 1825-1875 kHz and 1925-1975 kHz respectively. Other services to which the band 1800-2000 kHz is allocated may use any frequency therein on condition that no harmful interference is caused to the Loran system operating on 1850 or 1950 kHz.

REASON: No longer required for Region 2, but should be retained for Region 3. Loran radionavigation system in this band to be phased out by 1980 in the United States.

16.

kHz

2000-2045	2000-2065	
FIXED MOBILE except aeronautical mobile		FIXED MOBILE
193 195A		
2045-2065		
METEOROLICAL AIDS FIXED MOBILE except aeronautical mobile		
193 195A		

REASON: Domestically, this band is presently allocated to the maritime mobile service with limited use permitted by certain fixed stations. Retention of this band as presently allocated internationally for the purpose of retaining flexibility domestically in future sharing arrangements with other fixed and mobile services.

2065-2170	2065-2107	
FIXED MOBILE except aeronautical mobile (R)		MARITIME MOBILE 200
	2107-2170	
		FIXED MOBILE
193 195A		

17.

REASON: 2065-2107: Allocation retained to accommodate continuing need to provide services in this band in the maritime mobile service, and to meet future requirements.

2107-2170: Domestically, this band is presently allocated to a variety of fixed and mobile services.

Retention of this band as presently allocated internationally is for the purpose of retaining flexibility domestically in future sharing arrangements between fixed and mobile services as deemed necessary nationally.

NOC 200

REASON: There is a continuing need for this footnote.

kHz
2170-2194
MOBILE (distress and calling) 201 201A

REASON: There is a continuing need to maintain this band for international distress traffic and calling purposes.

NOC 201 & 201A

REASON: Same as indicated above.

2194-2300	*	2194-2300
	*	
FIXED	*	FIXED
MOBILE except aeronautical mobile (R)	*	MOBILE
	*	
	*	
193 195A	*	
	*	

REASON: Domestically, this band is presently allocated to a variety of fixed and mobile services. Retention of this band as presently allocated internationally is for the purpose of retaining flexibility domestically in future sharing arrangements between fixed and mobile services as deemed necessary nationally.

18.

kHz

Region 1	Region 2	Region 3
2300-2498 FIXED MOBILE except aeronautical mobile (R) BROADCASTING 202 193 195A	2300-2495 FIXED MOBILE BROADCASTING 202	
	2495-2505	
2498-2502 STANDARD FREQUENCY 203 203A	STANDARD FREQUENCY	
2502-2625 FIXED MOBILE except aeronautical mobile (R) 193 195A	203 203A	
	2505-2625 FIXED MOBILE	

REASON: 2300-2495: Same as reason stated for the band 2194-2300 kHz above. The allocation for broadcasting is being retained because of its use in tropical zones in other countries within Region 2.

2505-2625: Same as reason stated for the bands 2194-2495 kHz.

19.

kHz

Region 1	Region 2	Region 3
2625-2650 MARITIME MOBILE MARITIME RADIONAVIGATION 175 195A	2625-2850 FIXED MOBILE	
2650-2850 FIXED MOBILE except aeronautical mobile (R) 205 195A		

REASON: Same as stated for the bands 2194-2495 and 2505-2625 kHz.

2850-3025

AERONAUTICAL MOBILE (R)
201A 205A

REASON: Continued use through, and beyond, the year 2000 by the aeronautical mobile (R) service.

NOC 201A 205A

REASON: Continued need for search and rescue purposes.

20.

kHz

Region 1	* *	Region 2	* *	Region 3
3025-3155		AERONAUTICAL MOBILE (OR)		

REASON: Continued use through, and beyond, the year 2000 by the aeronautical mobile (OR) service.

3155-3200		FIXED MOBILE except aeronautical mobile (R)		

REASON: Domestically, this band is presently allocated to a variety of fixed and mobile services. Retention of this band as presently allocated internationally is for the purpose of retaining flexibility domestically in future sharing arrangements between fixed and mobile services as deemed necessary nationally.

3200-3230		FIXED MOBILE except aeronautical mobile (R) BROADCASTING 202		

REASON: Same as stated for the band 3155-3200 above. The allocation for the broadcasting service is being retained because of its use in the tropical zones in other countries within Region 2.

21.

kHz

Region 1	Region 2	Region 3
3230-3400	FIXED MOBILE except aeronautical mobile BROADCASTING 202 202A	

REASON: Same as stated for the band 3200-3230 kHz above.

3400-3500	AERONAUTICAL MOBILE (R)	

REASON: Continued use through, and beyond, the year 2000 by the aeronautical mobile (R) service.

3500-~~3800~~ AMATEUR ~~FIXED~~ ~~MOBILE except aeronautical mobile~~	3500-~~4000~~ 3900 AMATEUR ~~FIXED~~ ~~MOBILE except aeronautical mobile (R)~~	3500-3900 AMATEUR ~~FIXED~~ ~~MOBILE~~
3800-3900 AMATEUR ~~FIXED~~ ~~AERONAUTICAL MOBILE (OR)~~ ~~LAND MOBILE~~		206 207

ADD 202A The band 3230-3400 kHz is also allocated to the radiolocation service.

Reason: To accommocate radiolocation services for geophysical maritime and surveying functions.

22.

kHz

Region 1	Region 2	Region 3
3900-3950 AERONAUTICAL MOBILE (OR)	3900-4000 AMATEUR FIXED MOBILE except aeronautical mobile (R)	3900-3950 AERONAUTICAL MOBILE BROADCASTING
3950-4000 FIXED BROADCASTING		3950-4000 FIXED BROADCASTING

REASON: To provide exclusive world wide amateur allocation in the band 3500-3900 kHz. Domestically, the band 3500-4000 kHz is allocated exclusively to the amateur service. This allocation is not totally consistent with allocations in other parts of the world and has resulted in incompatible shares between services.

SUP 209 Reason: No longer required.

MOD 209A For the use of carrier frequency ~~4136.3 kHz (as from 1 January 1978 to be replaced by carrier frequency~~ 4125 kHz~~)~~ in the zone of Regions 1 and 2 south of latitude 15°N, including Mexico, and in the zone of Region 3 south of latitude 25°N, see no. 1351E.

Reason: To delete an obsolete date.

23.

kHz

Region 1	Region 2	Region 3
4000-4063	FIXED Mobile except aeronautical mobile (R)	
4063-4438	MARITIME MOBILE 208 ~~209~~ MOD 209A	
4438-~~4650~~ 4500	~~FIXED~~ ~~MOBILE except aeronautical mobile (R)~~ MARITIME MOBILE	4438-~~4650~~ 4500 ~~FIXED~~ ~~MOBILE except aeronautical mobile~~ MARITIME MOBILE
4500-4650	FIXED MOBILE except aeronautical mobile (R)	4500-4650 FIXED MOBILE except aeronautical mobile

REASON: Band reduced to expand spectrum available to the maritime mobile service in the adjacent lower band.

4650-4700	AERONAUTICAL MOBILE (R)	
4700-4750	AERONAUTICAL MOBILE (OR)	
4750-4850	FIXED AERONAUTICAL MOBILE (OR) LAND MOBILE BROADCASTING 202	4750-4850 FIXED BROADCASTING 202 MOBILE except aeronautical mobile (R)

25.

kHz

Region 1	* *	Region 2	* *	Region 3
4850-4995		FIXED LAND MOBILE BROADCASTING 202		
Reason: Continuing need for existing allocations.				
4995-5005		STANDARD FREQUENCY 203A 210		
5005-5060		FIXED BROADCASTING 202		
5060-~~5250~~ 5200		MOBILE except aeronautical mobile (R) FIXED		
Reason: Band reduced to expand spectrum available to the maritime mobile service in the adjacent upper band.				
5200-5250		~~FIXED~~ MARITIME MOBILE		
Reason: To provide additional spectrum for use by the maritime mobile service.				
Reason: Mobile except aeronautical mobile (R) added to specific bands to accommodate U.S. Government requirements.				

26.

kHz

Region 1	Region 2	Region 3
5250-~~5430~~ 5300	5250-~~5450~~ 5300	5250-~~5430~~ 5300
~~FIXED~~ ~~LAND MOBILE~~ MARITIME MOBILE	~~FIXED~~ ~~LAND MOBILE~~ MARITIME MOBILE	~~FIXED~~ ~~LAND MOBILE~~ MARITIME MOBILE

REASON: To provide additional spectrum for use by the maritime mobile service.

5300-5430	5300-5450	5300-5430
FIXED LAND MOBILE	FIXED LAND MOBILE	FIXED LAND MOBILE

REASON: Band reduced to expand spectrum available to the maritime mobile service in the adjacent lower band.

5430-5480	5450-5480	5430-5480
FIXED AERONAUTICAL MOBILE (OR) LAND MOBILE	AERONAUTICAL MOBILE (R)	FIXED AERONAUTICAL MOBILE (OR) LAND MOBILE

27.

kHz

Region 1	* *	Region 2	* *	Region 3
5480-5680		AERONAUTICAL MOBILE (R) 201A 205A		
5680-5730		AERONAUTICAL MOBILE (OR) 201A 205A		
5730- 5950		MOBILE except aeronautical mobile (R) FIXED		
5950-6200		BROADCASTING		
6200-6525		MARITIME MOBILE ~~211~~ MOD 211A		
6525-6685		AERONAUTICAL MOBILE (R)		
6685-6765		AERONAUTICAL MOBILE (OR)		

28

NOC 201A NOC 205A

SUP 211 Reason: No longer required.

MOD 211A For the use of carrier frequency ~~6204 kHz (as from 1 January 1978 to be replaced by carrier frequency~~ 6215.5 kHz~~)~~ in the zone of Region 3 south of latitude 25°N, see no. 1351F.

Reason: To delete an obsolete date.

29.

kHz

Region 1	* *	Region 2	* *	Region 3

6765-6950

FIXED
MOBILE except aeronautical mobile (R)

Reason: The service mobile except aeronautical mobile (R) is being added to provide for government requirements.

6950-7000

FIXED
AMATEUR
AMATEUR-SATELLITE

Reason: To provide additional spectrum for use by the amateur and amateur-satellite services.

7000-7100

AMATEUR
AMATEUR-SATELLITE

7100-7300 BROADCASTING 212	7100-7300 AMATEUR	7100-7300 BROADCASTING

7300-8195 7900

FIXED

Reason: Band reduced to expand spectrum available to the maritime mobile service in the adjacent higher band.

30.

kHz

Region 1	* *	Region 2	* *	Region 3
7900-8000		FIXED MOBILE except aeronautical mobile (R)		
8000-8195		FIXED MARITIME MOBILE		
8195-8815		MARITIME MOBILE 201A 213		

31.

kHz

Region 1	* *	Region 2	* *	Region 3
8815-8965		AERONAUTICAL MOBILE (R)		
8965 -9040		AERONAUTICAL MOBILE (OR)		

32.

kHz

Region 1	* *	Region 2	* *	Region 3
9040-9500		MOBILE except aeronautical mobile (R) FIXED		
9500-9775		BROADCASTING		
9775-9995		FIXED		
9995-10005		STANDARD FREQUENCY 201A 203A 214		
10005-10100		AERONAUTICAL MOBILE (R) 201A		
10100-10700		FIXED		
10700-11175		FIXED MOBILE except aeronautical mobile (R)		
11175-11275		AERONAUTICAL MOBILE (OR)		
11275-11400		AERONAUTICAL MOBILE (R)		
11400- 11700		FIXED 216		

Reason: Mobile except aeronautical mobile (R) added to specific bands to accommodate U.S. Government requirements.

33.

kHz

Region 1	* *	Region 2	* *	Region 3
11700-11975		BROADCASTING		
11975-~~12330~~ 12130		MOBILE except aeronautical mobile (R) FIXED		

Reason: Band reduced to expand spectrum available to the maritime mobile service.

12130-12330		~~FIXED~~ ~~MARITIME~~ MOBILE		

Reason: To provide additonal spectrum for use by the maritime mobile service.

12330-13200		MARITIME MOBILE 213		

34.

kHz

Region 1	* *	Region 2	* *	Region 3
13200-13260		AERONAUTICAL MOBILE (OR)		
13260-13360		AERONAUTICAL MOBILE (R)		

35.

kHz

Region 1	* *	Region 2	* *	Region 3
13360-~~14000~~ 13410		~~FIXED~~ RADIO ASTRONOMY ~~217~~		
Reason: To meet the needs of Radio Astronomy by providing 50 KHz for use in the 10-13 MHz band.				
13410-13700		MOBILE except aeronautical mobile (R) FIXED 217		
Reason: Band reduced to provide spectrum for use by Radio Astronomy in the adjacent lower band, and for use by Amateurs in the adjacent higher band.				
13700-13950		FIXED		
13950-14000		~~FIXED~~ AMATEUR ~~217~~		
Reason: To provide additional spectrum for use by the amateur service.				
14000-14250		AMATEUR AMATEUR-SATELLITE		
14250-14350		AMATEUR 218		
14350-~~14990~~ 14400		~~FIXED~~ AMATEUR		

36.

kHz

Region 1	* *	Region 2	* *	Region 3
14400-14600		FIXED		
14600-14990		MOBILE except aeronautical mobile (R) FIXED		

Reason: The service MOBILE except aeronautical mobile (R) in the preceding bands is being added where indicated to provide for government requirements.

NOC 217 Reason: Continuing need for ISM frequency.

37.

kHz

Region 1	Region 2	Region 3
14990-15010	STANDARD FREQUENCY 201A 203A 219	
15010-15100	AERONAUTICAL MOBILE (OR)	
15100-15450	BROADCASTING	
15450-~~16460~~ 15950	FIXED	

Reason: Band reduced to expand spectrum available to the maritime mobile service.

15950-16310	FIXED MOBILE except aeronautical mobile (R)	
16310-16460	~~FIXED~~ MARITIME MOBILE	

Reason: To provide additional spectrum for use by the maritime mobile service.

16460-17360	MARITIME MOBILE 213	
17360-~~17700~~ 17410	~~FIXED~~ MARITIME MOBILE	
17410-17700	FIXED	

Reason: Band reduced to provide additional spectrum for use by the maritime mobile service in the adjacent lower band.

38.

kHz

Region 1	Region 2	Region 3
17700-17900	BROADCASTING	
17900-17970	AERONAUTICAL MOBILE (R)	
17970-18030	AERONAUTICAL MOBILE (OR)	
18030-18052	FIXED	
18052-18068	FIXED Space Research	
18068-~~19990~~ 19000	FIXED	
19000-19500	FIXED MOBILE except aeronautical mobile (R)	

38 A.

kHz

Region 1	* *	Region 2	* *	Region 3
19500-19990		FIXED		
19990-20010		STANDARD FREQUENCY 201A 203A 220		
20010-~~21000~~ 20400		FIXED		
20400-20700		FIXED MOBILE except aeronautical mobile (R)		
20700-21000		~~FIXED~~ ~~AMATEUR~~ AMATEUR-SATELLITE		
21000-~~21450~~ 21200		AMATEUR AMATEUR-SATELLITE		

Reason: Band expanded to provide additional spectrum for use by the amateur and amateur-satellite services.

21200-21420		AMATEUR ~~AMATEUR-SATELLITE~~ MARITIME MOBILE		

Reason: Band reduced to provide additional spectrum for use by the maritime mobile service.

39.

kHz

Region 1	* *	Region 2	* *	Region 3
21420-21450		AMATEUR AMATEUR-SATELLITE FIXED		

Reason: Bands modified to provide additional spectrum for use by the maritime mobile service.

40.

kHz

Region 1	Region 2	Region 3
21450-21750	BROADCASTING	
21750-21850	FIXED MOBILE except aeronautical mobile (R)	
21850-21870	~~RADIO ASTRONOMY~~ AERONAUTICAL MOBILE (R) 221 B	
Reason: Band for radio astronomy moved to higher in the spectrum. (See 25850-26050 kHz)		
21870-22000	~~AERONAUTICAL FIXED~~ AERONAUTICAL MOBILE (R)	
Reason: To provide additional spectrum for the aeronautical mobile (R) service.		

41.

kHz

Region 1	* *	Region 2	* *	Region 3
22000-22720		MARITIME MOBILE		
22720-~~23200~~ 22855		~~FIXED~~ MARITIME MOBILE		
Reason: To provide addtional spectrum for use by the maritime mobile service.				
22855-~~23200~~ 23000		FIXED		
Reason: Band reduced to provide additional spectrum for the maritime mobile service in the adjacent lower band.				
23000-23200		FIXED MOBILE except aeronautical mobile (R)		
23200-23350		AERONAUTICAL FIXED ~~AERONAUTICAL~~ MOBILE (OR)		
23350-24990		MOBILE except aeronautical mobile (R) FIXED ~~LAND MOBILE~~ 222 222A		
24990-25010		STANDARD FREQUENCY 203A 223		
25010-25070		FIXED MOBILE except aeronautical mobile		
25070-25110		MARITIME MOBILE 224		

42.

kHz

Region 1	*	Region 2	*	Region 3
25110- 25600 25400		FIXED MOBILE except aeronautical mobile		

Reason: Band reduced to provide spectrum for the radio astronomy service.

43.

kHz

Region 1	Region 2	Region 3
25400-25600	~~FIXED~~ ~~MOBILE except aeronautical mobile~~ BROADCASTING	
25600-~~26100~~ 25850	BROADCASTING	
Reason: Band reduced to provide spectrum for the radio astronomy service in the adjacent upper band.		
25850-26050	RADIO ASTRONOMY ~~BROADCASTING~~	
Reason: To provide spectrum for use by the radio astronomy service.		
26050-26100	BROADCASTING	
26100-27500	FIXED MOBILE except aeronautical mobile 255 MOD 226	

NOC 225 Reason: Continued need for ISM frequency.

MOD 226 In ~~Region~~ 2, Australia and New Zealand, the amateur service may operate between the frequencies 26960 and 27230 kHz.

44.

MHz

Region 1	Region 2	Region 3
27.5-28 METEOROLOGICAL AIDS MOBILE except aeronautical mobile (R) 227	27.5-28 METEOROLOGICAL AIDS FIXED MOBILE except aeronautical mobile (R)	
28-29.7	AMATEUR AMATEUR-SATELLITE	
29.7-30.005	FIXED 228 229 231 232 MOBILE except aeronautical mobile (R)	
30.005-30.01	SPACE OPERATION (Satellite identification) FIXED 228 229 231 MOBILE except aeronautical mobile (R) SPACE RESEARCH	

Reason: Operational requirements remain constant and the need exists to confine operations to specific services and avoid interference from non-allocated services.

30.01-37.75	FIXED 228 229 230 231 MOBILE except aeronautical mobile (R) Radio Astronomy 233A MOD 233B		

MOD 233B In making assignments to stations of other services to which the bands ~~37.75~~ 37.5 - ~~38.25~~ 38.0 MHz, 150.05 - 153 MHz, 406.1 - 410 MHz, ~~2690~~ 2670 - 2700 MHz and ~~4700~~-4950 ~~5000~~-MHz are allocated, administrations are urged to take all practicable steps to protect radio astronomy observations from harmful interference.

Reason: To make provision for radio astronomy in the band 37.5 - 37.75 MHz, and 2670-2700 MHz bands.

45.

MHz

Region 1	* *	Region 2	* *	Region 3
37.75-38.25 38.00		FIXED 228 229 231 MOBILE Radio Astronomy MOD 233B		
38.00-38.25		FIXED 228 229 231 MOBILE Radio Astronomy RADIO ASTRONOMY 233B		
Reason: To provide for exclusive allocation to radio astronomy.				
38.25-41		FIXED 228 229 230 231 MOBILE except aeronautical mobile (R) 235 236 236A		
41-47 BROADCASTING Fixed 228 237 Mobile except aeronautical mobile (R) 236A 238 239 240 241		41-50 FIXED 228 231 237 MOBILE except aeronautical mobile (R) 233A 236A		41-44 FIXED 228 237 MOBILE except aeronautical mobile (R) 236A 44-50 FIXED 228 231 237 BROADCASTING MOBILE except aeronautical mobile (R)
Reason: Delete 237 in Regions 2 and 3 since not applicable. Reason: Operational Requirements remain constant. The term except aeronautical mobile (R) is a requirement of the U.S. Government. NOC 236 Reason: Continuing need for ISM frequency.				

1976

46.

MHz

Region 1	Region 2	Region 3
47–68		
	50–54	AMATEUR 244 245 246 247
BROADCASTING	54–68	54–68
	FIXED 228 237 MOBILE BROADCASTING	FIXED 228 231 237 MOBILE BROADCASTING 246
238 239 241 242 243		

Reason: Operational requirements remain constant.

47.

MHz

Region 1	Region 2	Region 3
68-~~74.8~~ 73.0 FIXED MOBILE except aeronautical mobile 248 249 250 251 252	68-73 FIXED MOBILE BROADCASTING	68-70 FIXED MOBILE AERONAUTICAL RADIONAVIGATION 254 255 256
		70-~~74.6~~ 73.0 FIXED MOBILE 256 257 258
73.00-74.60 FIXED MOBILE except aeronautical mobile RADIO ASTRONOMY ~~248~~ 249 250 251 252	73-74.6 RADIO ASTRONOMY MOD 253A 253B	73.0-74.6 FIXED MOBILE RADIO ASTRONOMY 256 257 258

MOD 253A In region 2, fixed, mobile and broadcasting service operations previously authorized in the band 73-74.6 MHz may continue to operate on a non-interference basis to the radio astronomy service until 12/31/85.

Reason: To make provisions for the use of the band 73.00-74.6 MHz by radio astronomy.

48.

MHz

Region 1	Region 2	Region 3
74.6-74.8 ~~FIXED~~ ~~MOBILE except aeronautical mobile~~ AERONAUTICAL RADIONAVIGATION ~~248 249 250~~ 251 252	74.6-75.4	AERONAUTICAL RADIONAVIGATION
74.8-75.2 AERONAUTICAL RADIONAVIGATION MOD 259		
75.2-~~87.5~~ 75.4 AERONAUTICAL RADIONAVIGATION ~~FIXED~~ ~~MOBILE except aeronautical mobile~~ ~~248 250~~ 252 ~~260 261 262 263~~ MOD 259	—	MOD 259

Reason: To align region 1 with regions 2 and 3 in providing common worldwide band for aeronautical marker beacons.

MOD 259 The frequency 75 MHz is assigned to aeronautical marker beacons. Administrations shall refrain from assigning frequencies close to the limits of the guardband to stations of other services which, because of their power or geographical position, might cause harmful interference or otherwise place a constraint on te marker beacons.

Reason: To further protect the marker beacon frequency.

49.

MHz

Region 1	Region 2	Region 3
75.4–87.5 FIXED MOBILE except aeronautical mobile 248 250 252 260 261 262 263	75.4–88 FIXED MOBILE BROADCASTING	75.4–78 FIXED MOBILE 255 256 257 266
		78–80 FIXED MOBILE AERONAUTICAL RADIONAVIGATION 255 256 257 261 266
		80–87 FIXED MOBILE 254 255 256 257 261 266
87.5–100 BROADCASTING 264 265	88–100 BROADCASTING	87–100 FIXED MOBILE BROADCASTING 254 267 268

Reason: Requirements remain unchanged.

50.

MHz

Region 1	* *	Region 2	* *	Region 3
100-108		100-108		
MOBILE except aeronautical mobile (R)				BROADCASTING
269 270 271				255 256 258 267 272

Reason: Requirement remains same.

108-117.975

AERONAUTICAL RADIONAVIGATION

117.975 - 132

AERONAUTICAL MOBILE (R)
201A 273 MOD 273A 273B

132-136

AERONAUTICAL MOBILE (R)
MOD 273A 273B 274 ~~274A~~ 274B 275

MOD 273A In the band 117.975-~~132~~ MHz ~~and in the band 132~~-136 MHz, where ~~the aeronautical mobile (R) service is authorized, the use and development for this service of~~ space communications techniques may be authorized for the aeronautical mobile (R) service ~~but limited initially to satellit relay stations of the aeronautical mobile (R) service~~. Such use ~~and development~~ shall be subject to coordination between administrations concerned and those having services operating in accordance with the Table, which may be affected.

Reason: To provide for full satellite application in the band 117.975-136 MHz as a logical extension of the existing terrestrial service.

ADD 273B In the band 117.975-136 MHz, the use of airborne electronic aids to air navigation and any directly associated ground based or satellite borne facilities also may be authorized. Such use shall be subject to coordination between administrations concerned and those having services operating in accordance with the Table, which may be affected.

Reason: To provide flexibility required for position determination through the use of satellites.

SUP 274A

Reason: The date of applicability has passed.

51.

Region 1	Region 2	Region 3
136-137	SPACE RESEARCH (Space-to-Earth) 281A 281AA	
137-138	SPACE OPERATION (Telemetering and tracking) METEOROLOGICAL-SATELLITE SPACE RESEARCH (Space-to-Earth) 275A 279A 281C 281E	

52.

MHz

Region 1	Region 2	Region 3
138- 143.6	138-143.6	138- 143.6
AERONAUTICAL MOBILE (OR)	FIXED MOBILE Radiolocation Space Research (Space-to-Earth)	FIXED MOBILE Space Research (Space-to-Earth)
275 281G 282A 283	283A	278 279A 284

53.

MHz

Region 1	Region 2	Region 3
143.6–143.65	143.6–143.65	143.6–143.65
AERONAUTICAL MOBILE (OR) SPACE RESEARCH (Space-to-earth)	FIXED MOBILE Radiolocation Space Research (Space-to-Earth)	FIXED Space Research (Space-to-Earth) MOBILE
275 283	283A	278 279A 284
143.65–144	143.65–144	143.65–144
AERONAUTICAL MOBILE (OR)	FIXED MOBILE Radiolocation Space Research (Space-to-Earth)	FIXED MOBILE Space Research (Space-to-Earth)
275 283 282A		278 279A 284
144–146	AMATEUR AMATEUR-SATELLITE	
146–149.9	146–148	
FIXED MOBILE except aeronautical mobile (R)		AMATEUR
285 285A		289

54.

MHz

Region 1	Region 2	Region 3
	148-149.9 FIXED MOBILE 285A 290	

55.

MHz

Region 1	Region 2	Region 3
149.9-150.05	RADIONAVIGATION-SATELLITE 285B 285C	
150.05-151 FIXED MOBILE except aeronautical mobile (R) RADIO ASTRONOMY MOD 233B 285 286A	150.05-174 FIXED MOBILE	150.05-170 FIXED MOBILE
151-153 FIXED MOBILE except aeronautical mobile (R) RADIO ASTRONOMY Meteorological Aids MOD 233B 285 286A		
153-154 FIXED MOBILE except aeronautical mobile (R) Meteorological Aids 285		
154-156 FIXED MOBILE except aeronautical mobile (R) 285		

56.

MHz

Region 1	Region 2	Region 3
156-174		201A 287 290
		170-174
FIXED MOBILE except aeronautical mobile		FIXED MOBILE BROADCASTING
201A 285 287 288	201A 233A 287	

Reason: Services required as existing now.

NOC 287 Reason: Existing provisions must be continued.

57.

MHz

Region 1	Region 2	Region 3
174-216	174-216	
BROADCASTING		FIXED MOBILE BROADCASTING
291 292 293 ~~294~~		~~294~~ 295 296
216-~~223~~ 220	216-220	216-~~225~~ 220
AERONAUTICAL RADIONAVIGATION BROADCASTING	FIXED MOBILE RADIOLOCATION	AERONAUTICAL RADIONAVIGATION Radiolocation
297 298 299 300 ~~301~~		306 307 308
220-223	220-225	220-225
~~AERONAUTICAL RADIONAVIGATION~~ ~~BROADCASTING~~ AMATEUR AMATEUR-SATELLITE RADIOLOCATION MOBILE	AMATEUR AMATEUR-SATELLITE RADIOLOCATION MOBILE	~~AERONAUTICAL RADIONAVIGATION~~ ~~Radiolocation~~ AMATEUR AMATEUR-SATELLITE RADIOLOCATION MOBILE
297 298 299 300 301		
223-~~235~~ 225		
~~AERONAUTICAL RADIONAVIGATION~~ ~~Fixed~~ ~~Mobile~~ AMATEUR AMATEUR-SATELLITE RADIOLOCATION MOBILE		
299 300 301 302 303 304 305		306 307 308

58.

Reason: To provide for extensive development and application of Amateur-Satellite techniques; to provide for the expanded land mobile need.

SUP 294 Reason: To enhance sharing.

59.

MHz

Region 1	Region 2	Region 3
225-235 AERONAUTICAL RADIONAVIGATION Fixed Mobile ~~299~~ ~~300~~ ~~301~~ 302 303 304 305	225-235 FIXED MOBILE	225-235 FIXED MOBILE AERONAUTICAL RADIONAVIGATION

Reason: Requirements remain unchanged.

60.

MHz

Region 1	* *	Region 2	* *	Region 3
235-267 FIXED MOBILE 201A 305 305A 308A 309				

Reason: Requirements remain unchanged

267-272 FIXED MOBILE Space Operations 309A 309B (telemetering) 308A	267-272 FIXED MOBILE Space Operations 309A 309B (telemetering) 308A	267-272 FIXED MOBILE Space Operations 309A 309B (telemetering) 308A

Reason: Delete 309A and 309B in Region 2 as not being required

61.

MHz

Region 1	* *	Region 2	* *	Region 3
272-273 FIXED MOBILE SPACE OPERATIONS 309A (telemetering) 308A		272-273 FIXED MOBILE SPACE OPERATIONS 309A (telemetering) 308A		272-273 FIXED MOBILE SPACE OPERATIONS 309A (telemetering) 308A

Reason: Delete 309A in Region 2 as not being required.

273-328.6

FIXED
MOBILE

308A 310 310A

Reason: Requirements remain unchanged.

62.

MHz

Region 1	*	Region 2	*	Region 3

328.6-335.4

AERONAUTICAL RADIONAVIGATION

311

Reason: Necessary for continuing and expanding needs of service.

335.4-399.9

FIXED
MOBILE

308A

Reason: Requirements remain unchanged.

63.

MHz

Region 1	Region 2	Region 3
399.9-400.05	RADIONAVIGATION-SATELLITE 285C 311A	
400.05-400.15	STANDARD FREQUENCY-SATELLITE 312B 313 314	

64.

MHz

Region 1	Region 2	Region 3
400.15–401	METEOROLOGICAL AIDS METEOROLOGICAL-SATELLITE (Maintenance telemetering) SPACE RESEARCH (Telemetering and tracking) 313 314	
401–402	METEOROLOGICAL AIDS SPACE OPERATION (Telemetering) 315A Fixed Meteorological-Satellite (Earth-to-Space) Mobile except aeronautical mobile 314 315 315B 315C 316	
402–403	METEOROLOGICAL AIDS Fixed Meteorological-Satellite (Earth-to-space) Mobile except aeronautical mobile 314 315 315C 316	
403–406	METEOROLOGICAL AIDS Fixed Mobile except aeronautical mobile 314 315 316	
406–406.1	MOBILE-SATELLITE (Earth-to-space) 314 317A 317B	

Reason: Services required as existing now.

65.

MHz

Region 1	*	Region 2	*	Region 3
406.1-410		FIXED MOBILE except aeronautical mobile RADIO ASTRONOMY MOD 233B 314		
410-~~420~~		FIXED MOBILE except aeronautical mobile 314		

Reason: Requirements remain unchanged.

420-430 FIXED MOBILE except aeronautical mobile Radiolocation 318 319	*	420-~~450~~ 435 RADIOLOCATION Amateur 318 ~~319A~~ 319B ~~320A~~ 323 324
430-~~440~~ 435 AMATEUR RADIOLOCATION 318 319 319B 320 ~~320A~~ 321 322	*	

66.

MHz

Region 1	*	Region 2	*	Region 3
435-438	*	435-438		
AMATEUR RADIOLOCATION	*	Amateur RADIOLOCATION		
Amateur-Satellite	*	Amateur Satellite		
318 319 ~~319B~~ 320 ~~320A~~ ~~321~~ ~~322~~	*	318 ~~319A~~ ~~319B~~ ~~320A~~ 323 324		

NOC 318 Reason: Requirement remains unchanged.

SUP 320A Reason: Consequential to allocation proposal.

67.

MHz

Region 1	Region 2	Region 3
438-440 RADIOLOCATION AMATEUR 318 319 ~~319B~~ 320 ~~320A~~ ~~321~~ 322	438-450	RADIOLOCATION Amateur
440-450 FIXED MOBILE except aeronautical mobile Radiolocation 318 319 319A		318 319A ~~319B~~ ~~320A~~ 323 324

Reason: The allocation change in the band 435 MHz-438 MHz is required to accommodate greater flexibility in amateur satellite experimentation Footnote suppression and other reallocations are consequential to this allocation.

450-460	FIXED MOBILE 318B 318C 318 319A	
460-470	FIXED MOBILE 318B 318 C Meteorological-Satellite (Space-to-Earth) 318A 324B	

NOC 318B, 318C
Reason: Continuing requirement

470-806 MHz

Specific allocations are not being proposed at this time. However, the following services have requested spectrum space in this band (See page 13 of the narrative portion of this NOI):

Non-Government

Broadcasting, Television
Broadcasting, Frequency Modulation
Land Mobile
Aeronautical Mobile
Maritime Mobile
Radio Astronomy
Broadcasting Satellite

Government

Fixed
Mobile
Mobile-Satellite

Also the Federal Government proposes that the band 608-614 MHz be allocated on an exclusive world-wide basis to the Radio Astronomy Service.

69.

MHz

Region 1	Region 2	Region 3
806-890	806-890	806-890
FIXED BROADCASTING	BROADCASTING MOBILE	FIXED MOBILE BROADCASTING
329 331 333 334	329A 332 332A ADD 329B	330B 332 332A 338 339

Reason: This allocation is needed to provide for expanded needs of the Land Mobile Service. Footnote changes are consequential to this allocation.

Add 329B In Region 2, the band 806-890 MHz is also allocated for the use and development of systems using space radiocommunications techniques. Such use and development is subject to agreement and coordination between the administrations concerned and those having services, operating in accordance with the table, which may be affected.

Reason: To provide spectrum allocation for possible development and use of a mobile satellite system for public services.

70.

MHz

Region 1	* *	Region 2	* *	Region 3
890-942 896 FIXED BROADCASTING Radiolocation 329 331 333 339A		890-942 896 FIXED RADIOLOCATION MOBILE 339A 340		890-942 896 MOBILE FIXED BROADCASTING Radiolocation 339 339A

Reason: This allocation is required to meet the expanded needs of the Land Mobile Service.

896-902 FIXED BROADCASTING Radiolocation RADIOLOCATION MOBILE 329 331 333 339A		896-902 FIXED RADIOLOCATION MOBILE 339A 340		896-902 FIXED MOBILE BROADCASTING RADIOLOCATION Radiolocation 339 339A
902-928 FIXED Radiolocation BROADCASTING 329 331 333 339A MOD 340		902-928 FIXED RADIOLOCATION Amateur Mobile 339A MOD 340		902-928 FIXED MOBILE BROADCASTING Radiolocation 339 339A MOD 340

Reason: This allocation is required to meet the expanding needs of the Land Mobile Service and to provide for experimentation by the Amateur Radio Service.

928-941 FIXED Radiolocation BROADCASTING 329 331 333 339A		928-941 FIXED RADIOLOCATION MOBILE 339A		928-941 MOBILE FIXED Radiolocation BROADCASTING 339 339A

Reason: This allocation is required to meet the expanding needs of the Land Mobile Radio Service. Footnote suppression and addition are consequential to this change.

MOD 340 In Region 2, The frequency 915 MHZ is designated for industrial, scientific and medical purposes. Emissions must be confined within the limits of ±13 MHz of that frequency. Radiocommunication services operating within these limits must accept any harmful interference that may be experienced from the operation of industrial, scientific and medical equipment.

Reason: To provide for ISM frequency worldwide.

71

MHz

Region 1	Region 2	Region 3
941-942 FIXED BROADCASTING Radiolocation RADIOLOCATION MOBILE 329 331 333 339A	941-942 FIXED RADIOLOCATION MOBILE 339A 340.	941-942 FIXED BROADCASTING Radiolocation RADIOLOCATION MOBILE 339 339A

72.

MHz

Region 1	Region 2	Region 3
942-947 FIXED -BROADCASTING- MOBILE 329 331 333 339A	942-947 FIXED MOBILE 339A 329B	942-947 MOBILE FIXED BROADCASTING- 338 339 339A

Reason: This allocation is required to meet the expanding needs of the Mobile Radio Services. The bands 896-902 MHz and 941-947 MHz may be used for an air-ground Common Carrier service.

947-952 FIXED BROADCASTING 329 331 333 339A	947-952 FIXED 339A	947-952 FIXED BROADCASTING MOBILE 338 339 339A

Reason: This allocation is required to provide exclusive allocation to the Fixed Service.

73.

MHz

Region 1	Region 2	Region 3
952-960	952-960	952-960
FIXED BRCADCASTING	FIXED MOBILE	FIXED MOBILE BROADCASTING
329 331 333 339A	339A	338 339 339A

Reason: This allocation is required to provide for expanding needs of the Mobile Radio Service.

960-1215

AERONAUTICAL RADIONAVIGATION
341

Reason: Continuing requirement.

74.

MHz

Region 1	Region 2	Region 3
1215-~~1300~~ 1240	RADIONAVIGATION SATELLITE RADIOLOCATION Amateur 342 343 344 345 346A	
1240-~~1300~~ 1290	RADIOLOCATION Amateur 342 343 344 345 346A	
1290-1300	RADIOLOCATION Amateur Amateur Satellite 342 343 344 345 346A	
1300-1350	AERONAUTICAL RADIONAVIGATION MOD 346 Radiolocation 346A 347 348 MOD 349A 349B	

Reason: Spectrum in the 1290-1300 band can be shared on a secondary basis for amateur satellite research. Band 1215-1350 needed for continued and expanding use of radiolocation and aeronautical radionavigation services.

1350-~~1400~~ 1370 FIXED MOBILE RADIOLOCATION 346A 349 MOD 349A 349B	1350-~~1400~~ 1370 RADIOLOCATION 346A 349 MOD 349A 349B

75.

ADD 346A In the bands 1215-1400 MHz, 3100-3300 MHz, 5250-5350 MHz, and 9500-9800 MHz radiolocation operations using space techniques may be conducted in support of Space Research and Earth Exploration Satellite services provided that harmful interference is not caused to terrestrial Radiolocation and Aeronautical Navigation services or the Radionavigation Satellite service in the band 1215-1240 MHz.

Reason: This is the low-band required for multifrequency radars required for the measurement of rain, drop size, rain cloud echo and melting-layer height mapping. Also required for imaging radars of a future mission. The proposal is considered compatible with existing usage.

MOD 346 The use of the bands 1300-1350 MHz, 2700-2900 MHz and 9000-9200 MHz by the aeronautical radionavigation service is restricted to ground-based radars and, ~~in the future~~, to associated transponders which transmit only on frequencies in these bands and only when actuated by radars operating in the same band.

ADD 349B In the band 1300-1370 MHz, Earth Exploration Satellite (EES) passive sensors may be used. Administrations are urged to take all practicable steps to minimize interference to the EES Service in this band. (This footnote status with the assurance that 349B will be adopted nationally subsequent to the Conference).

Reason: Preceeding notes reflect the requirements of the U.S. Government.

76.

MHz

Region 1	Region 2	Region 3
1370-1400 FIXED MOBILE RADIOLOCATION 349 349A	1370-1400 RADIOLOCATION 349 349A	

MOD 349A: Radio astronomy observations on the Hydrogen line displaced towards lower frequencies are carried out in a number of countries under national arrangements. Administrations should bear in mind the needs of the radio astronomy service in their future planning of the band ~~1350~~ 1330-~~1400~~ 1370 MHz.

Reason: Use of the 1330-1370 MHz band for radio astronomy will permit observation of the hydrogen line considered to be of major astronomical significance. The bands above otherwise are needed for the continued use and expansion of fixed mobile and radiolocation services.

1400-1427	EARTH EXPLORATION SATELLITE (Passive) SPACE RESEARCH (Passive) RADIO ASTRONOMY

Reason: This is an important band for the hydrogen line and for continum observations.

1427-1429	SPACE OPERATION (Telecommand) FIXED MOBILE except aeronautical mobile

77.

MHz

Region 1	Region 2	Region 3
1429-1525 FIXED MOBILE except aeronautical mobile	1429-1435 FIXED MOBILE	1429-1525 FIXED MOBILE
	1435-1525 MOBILE 349C Fixed	

ADD 349C: In Region 2 where the mobile service is authorized in the bands 1435-1535 MHz and 2310-2450 MHz the primary allocation is to the aeronautical mobile service for telemetering purposes.

Reason: The change is required to provide for aeronautical telemetering. The bands are otherwise required for continued use and expansion of the fixed and mobile services.

78.

MHz

Region 1	Region 2	Region 3
1525-1535 SPACE OPERATION (Telemetering) 350A FIXED 350B Earth Exploration- Satellite Mobile except aeronautical mobile 350C	1525-1535 SPACE OPERATION (Telemetering) 350A Earth Exploration- Satellite Mobile 350D 349C Fixed	1525-1535 SPACE OPERATION (Telemetering) 350A FIXED 350B Earth Exploration- Satellite Mobile
1535-1542.5 MARITIME MOBILE-SATELLITE 352 352D 352E		

Reason: Band is required for continuing need of maritime mobile satellite service.

79.

MHz

Region 1	Region 2	Region 3
1542.5-1543.5	AERONAUTICAL MOBILE SATELLITE (R) MARITIME MOBILE SATELLITE 352 352D 352F	
1543.5- 1558.5	AERONAUTICAL MOBILE SATELLITE (R) 352 352D 352G	
1558.5-~~1636.5~~ 1595	RADIONAVIGATION SATELLITE AERONAUTICAL RADIONAVIGATION 352 352A 352B 352D	
1595-1636.5	AERONAUTICAL RADIONAVIGATION AERONAUTICAL RADIONAVIGATION SATELLITE 352 352A 352B 352D MOD352K	

MOD 352K Radio astronomy observations on important spectral lines due to the hydroxyl radicle OH at ~~frequencies~~ 1612.231 MHz and 1720.530 MHz are carried out in a number of countries under national arrangements; the bands observed being ~~1611.5-1612.5~~ 1610.5-1614 MHz and 1720-1721 MHz respectively. ~~Administrations should bear in mind the needs of radio astronomy service in their future planning of the bands 1558.5-1636.5 MHz and 1710-1770 MHz.~~

In making assignments in the band 1595 -1636.5 MHz and 1720-1721 administrations are urged to prevent harmful interference to radio astronomy observations, particularly from airborne or spaceborne transmitters.

Reason: Protection of observation of important spectral line.

80.

MOD 352A The bands 1558.5-1636.5 MHz, 4200-4400 MHz, 5000-5250 MHz and 15.4-15.7 GHz are reserved on a world-wide basis for the use and development of airborne electronic aids to air navigation and any directly associated ground-based or satellite-borne facilities.

81.

MHz

Region 1	Region 2	Region 3
1636.5-1644	MARITIME MOBILE-SATELLITE 352 352D 352H	
1644-1645	AERONAUTICAL MOBILE SATELLITE (R) MARITIME MOBILE-SATELLITE 352 352D 352I	
1645-1660	AERONAUTICAL MOBILE-SATELLITE (R) 352 352D 352J	

82.

MHz

Region 1	Region 2	Region 3
1660-1670	RADIO ASTRONOMY METEOROLOGICAL AIDS MOD 353A 354 354A 354B	

MOD 353A In view of the successful detection by astronomers of two hydroxl spectral lines in the regions of 1665 MHz and 1667 MHz administrations are urged ~~to give all practicable protection in the band 1660-1670 MHz for future research in radio astronomy particularly~~ by eliminate air-to-ground transmissions in the meteorological aids service in the band 1664.4-1668.4 MHz as soon as practicable. Until such operations are phased out, radiosonde operations will, where possible, be notified to the radio astronomers.

1670-1690	METEOROLOGICAL AIDS FIXED METEOROLOGICAL-SATELLITE (Space-to-Earth) 324A MOBILE except aeronautical mobile 354	

83.

MHz

Region 1	Region 2	Region 3
1690 - 1700 METEOROLOGICAL AIDS METEOROLOGICAL-SATELLITE (Space-to-Earth) Fixed Mobile except aeronautical mobile 324B 354A	1690 - 1700 METEOROLOGICAL AIDS METEOROLOGICAL-SATELLITE (Space-to-Earth) 324B 354A 354C	
1700 - 1710 ~~FIXED~~ ~~SPACE RESEARCH (Space-to-Earth)~~ ~~Mobile~~ METEOROLOGICAL SATELLITE (Space-to-Earth) ~~354D~~	1700 - 1710 ~~FIXED~~ ~~MOBILE~~ METEOROLOGICAL SATELLITE (Space-to-Earth) ~~SPACE RESEARCH (Space-to-Earth)~~ ~~354D~~	

REASON: Required worldwide for meteorological satellites.

1710 - ~~1770~~ 1720 FIXED Mobile MARITIME MOBILE-SATELLITE 356B ~~352K~~ 356	1710 - ~~1770~~ 1720 FIXED MOBILE MARITIME MOBILE-SATELLITE 356B ~~352K 356A~~	

REASON: To provide for anticipated heavy demand for maritime satellite services. PFD limit to be established.

84.

MHz

Region 1	Region 2	Region 3
MOD 356A: In Region 2, in Australia and Japan the band ~~1750~~ 1770 - 1850 MHz may also be used for earth-to-space transmissions and in Regions 2 and 3, the band 2200 - 2290 MHz may also be used for space-to-earth transmissions in the space research service, subject to agreement between the administrations concerned and those having services operating in accordance with the table, which may be affected.		
REASON: Consequential to allocation change.		
ADD 356B The use of the band 1710-1720 MHz in the Maritime Mobile service is limited to transmissions from space stations to ship earth stations for communications and/or radio determination purposes.		
REASON: To provide for a directional indicator for transmission path and multiservice functions.		
1720 - 1721 FIXED Mobile ~~352K~~ 356 MOD 352K	1720 - 1721 FIXED MOBILE ~~352K~~ ~~356A~~ MOD 352K	
1721 - 1770 FIXED SPACE OPERATIONS (Earth-to-Space) Mobile ~~352K~~ 356	1721 - 1770 FIXED SPACE OPERATIONS (Earth-to-Space) MOBILE ~~352K~~ ~~356A~~	

85.

MHz

Region 1	Region 2	Region 3
1770 - 1790 FIXED SPACE OPERATIONS (Earth-to-Space) Meteorological-Satellite 356AA Mobile 356	1770 - 1790 FIXED SPACE OPERATIONS (Earth-to-Space) MOBILE Meteorological-Satellite 356AA MOD 356A	
1790 - ~~2290~~ 1850 FIXED SPACE OPERATION (Earth-to-Space) Mobile 356 ~~356AB~~ 356ABA ~~356AC~~	1790 - ~~2290~~ 1850 FIXED SPACE OPERATION (Earth-to-Space) MOBILE MOD 356A ~~356AB~~ ~~356ABA~~	
1850-2025 FIXED Mobile 356 356AB 356ABA 356AC	1850-2025 FIXED MOBILE 356A 356AB 356ABA	

Reason: To support U.S. Government requirements for telemetry, tracking and control of satellites.

86.

MHz

Region 1	* *	Region 2	* *	Region 3
2025-2110 FIXED EARTH EXPLORATION SATELLITE (Earth-to-space) SPACE RESEARCH (Earth-to-space) Mobile 356 ~~356AB~~ ~~356AC~~ ~~356ABA~~		2025-2110 FIXED MOBILE EARTH EXPLORATION SATELLITE (Earth-to-space) SPACE RESEARCH (Earth-to-space) 356A 356AB 356ABA		
2110-2120 FIXED Mobile SPACE RESEARCH (Earth-to-space)(Deep space only) 356 MOD 356AB 356ABA 356AC 356ABA 356A MOD 356AB		2110-2120 FIXED MOBILE SPACE RESEARCH (Earth-to-space) (Deep space only)		
2120-2200 FIXED Mobile 356 356AB 356ABA 356AC		2120-2200 FIXED MOBILE 356A 356AB 356ABA		
2200-2290 FIXED Mobile SPACE RESEARCH (Space-to-Earth) (Space-to-Space) SPACE OPERATIONS (Space-to-Earth) (Space-to-Space) 356 356AB- 356ABA		2200-2290 FIXED MOBILE SPACE RESEARCH (Space-to-Earth) (Space-to-Space) SPACE OPERATIONS (Space-to-Earth) (Space-to-Space) MOD 356A 356AB- 356ABA		

MOD 356AB In Regions 2 and 3 and in Spain, in the band 2025 2110-2120 MHz Earth-to-space transmissions in the earth exploration-satellite service may be authorized with ~~equality~~ of right to operate with stations of other space radiocommunication services in this band and subject to agreement between the administrations concerned and those having services, operating in accordance with the Table, which may be affected.

Reason: Previous band changes are requirements of the U.S. Government

87.

MHz

Region 1	* *	Region 2	* *	Region 3
2290-2300 FIXED SPACE RESEARCH (Space-to-Earth) (Deep space only) Mobile except aeronautical mobile 356C		2290-2300 FIXED MOBILE except aeronautical mobile SPACE RESEARCH (Space-to-Earth) (Deep space only)		

Reason: Continued use of the band for fixed and mobile services and requirements for meteorological satellites and space research.

88.

MHz

Region 1	Region 2	Region 3
2300 - ~~2450~~ 2310 FIXED Amateur Mobile Radiolocation ~~357~~ 358 359	2300 - ~~2450~~ 2310 RADIOLOCATION Amateur Fixed Mobile ~~357~~ 360	
2310 - 2320 Amateur-Satellite FIXED Amateur Mobile Radiolocation ~~357~~ 358 359	2310 - 2320 Amateur-Satellite RADIOLOCATION Amateur Fixed Mobile ~~357~~ 360 349C	
2320-2450 FIXED Amateur Mobile Radiolocation 357 358 359 357A	2320-2450 RADIOLOCATION Amateur Fixed Mobile 357 360 357A 349C	

Add 357A The frequencies 2450 MHz and 5800 MHz are designated for the wireless transmission of power. Emissions must be confined within ± 50 MHz of the frequencies designated. This electrical energy transfer may be effected from space-to-earth, space-to-space, or point-to-point on the earth.

NOC 357

Reason: Bands are needed for continued use of fixed, mobile, amateur and radiolocation services. Amateur satellite operation on a world wide basis is feasible in the 2310-2320 band on a secondary basis.

89.

MHz

Region 1	* *	Region 2	* *	Region 3
2450-2500 FIXED MOBILE Radiolocation Land Mobile-Satellite 357 361 357A		2450-2500 FIXED MOBILE Land Mobile-Satellite RADIOLOCATION 357 357A		

Reason: Expanding needs for land mobile satellite service requires spectrum space. In addition there is continuing demand for fixed and mobile services and radiolocation requirements.

90.

MHz

Region 1	Region 2	Region 3
2500 - 2550 FIXED 364C MOBILE except aeronautical mobile BROADCASTING-SATELLITE MOD 361B	2500 - 2535 FIXED 364C FIXED-SATELLITE (Space-to-Earth) MOBILE except aeronautical mobile BROADCASTING-SATELLITE MOD 361B 361A 364E 364F	
	2535 - 2550 FIXED 364C MOBILE except aeronautical mobile BROADCASTING-SATELLITE MOD 361B 361A 364F	
361A 362 364F		
2550 - 2655 FIXED 364C MOBILE except aeronautical mobile BROADCASTING-SATELLITE MOD 361B 362 363 364 364F		

REASON: Continued and expanding use of fixed service systems, radiolocation facilities, mobile operations and satellite systems, with heavy demands on available spectrum.

91.

MHz

Region 1	Region 2	Region 3
2655 - ~~2690~~ 2670	2655 - ~~2690~~ 2670	
FIXED 364C 364D	FIXED 364C 364D	
MOBILE except aeronautical mobile	FIXED-SATELLITE (Earth-to-Space)	
BROADCASTING-SATELLITE MOD 361B MOD 364H	MOBILE except aeronautical mobile	
	BROADCASTING-SATELLITE MOD 361B MOD 364H	
363 364 364F ~~364G~~	364E 364F ~~364G~~	

MOD 361B: The use of the band 2500 - ~~2690~~ 2670 MHz by the broadcasting satellite service is limited to domestic and regional systems for community reception and such use is subject to agreement between the administrations concerned and those having services operating in accordance with the table, which may be affected (see Resolutions Nos. Spa2-2 and Spa2-3). The power flux density at the earth's surface shall not exceed the values given in Nos. 470NH - 470NK.

MOD 364H: In the design of systems in the broadcasting satellite service, administrations are urged to take all necessary steps to protect the radio astronomy service in the band 2670 ~~2690~~ - 2700 MHz.

REASONS: To allow radio astronomy to share the 2670 - 2700 MHz band with other services without harmful interference. Bands are otherwise required for the continued use and expansion of the fixed and satellite services (Earth-to-Space).

2670 - 2690	2670 - 2690
MOBILE except aeronautical mobile	RADIO ASTRONOMY
FIXED 364C 364D	MOBILE except aeronautical mobile
~~BROADCASTING-SATELLITE~~ 361B 364H	FIXED 364C 364D
RADIO ASTRONOMY	~~BROADCASTING-SATELLITE~~ 361B 364H
	FIXED SATELLITE (Earth-to-Space)
363, 364, 364F, 364G MOD 233B	364E 364F 364G MOD 233B

92.

MHz

Region 1	Region 2	Region 3
	SPACE RESEARCH (Passive)	
2690 - 2700	RADIO ASTRONOMY	
	EARTH EXPLORATION SATELLITE (Passive)	
	MOD 233B 363 364A 364B	

REASONS: Changes are necessary to permit radio astronomers the use of a wider band for continuum measurements for galactic studies of ionized hydrogen and non-thermal radio services and afford protection from adjacent band interference. Bands are also required for the continued use and expansion of fixed and mobile services and satellite systems.

2700 - 2900	AERONAUTICAL RADIONAVIGATION	MOD 346
	Radiolocation	
	366	
2900 - 3100	RADIONAVIGATION 367 367A 367B	
	Radiolocation	
3100 - 3300	RADIOLOCATION	
	346A 354 368 369	

REASON: Continued and expanding use of aeronautical radionavigation and radiolocation facilities.

93.

MHz

Region 1	Region 2	Region 3
3300 - 3400 RADIOLOCATION 370 371	3300 - 3400 Fixed RADIOLOCATION Amateur 376	3300-3400 RADIOLOCATION Amateur 376

REASON: Continued use of band by amateur and radiolocation operations. Fixed service spectrum space is urgently needed.

3400 - ~~3600~~ 3410 FIXED FIXED-SATELLITE (Space-to-Earth) MOBILE Radiolocation Amateur-Satellite Amateur 372 373 374 375	3400 - ~~3500~~ 3410 FIXED-SATELLITE (Space-to-Earth) RADIOLOCATION Amateur Amateur-Satellite 376

REASON: The band 3400 - 3410 can be shared on a secondary basis with the amateur satellite service which needs this spectrum for continued research in this field.

3410 - 3500 FIXED FIXED-SATELLITE (Space-to-Earth) MOBILE Radiolocation 372 373 374 375	3410 - 3500 FIXED-SATELLITE (Space-to-Earth) RADIOLOCATION Amateur 376

94.

MHz

Region 1	Region 2	Region 3
3500 - 3600 FIXED FIXED-SATELLITE (Space-to-Earth) MOBILE Radiolocation 372 373 374 375	3500 - 3700 FIXED FIXED-SATELLITE (Space-to-Earth) MOBILE RADIOLOCATION AERONAUTICAL RADIONAVIGATION	3500 - 3700 FIXED-SATELLITE (Space-to-Earth) RADIOLOCATION Fixed Mobile 377 378
~~3600 - 4200~~ 3700 FIXED FIXED-SATELLITE (Space-to-Earth) MOBILE 374		
3700 - 4200 FIXED FIXED-SATELLITE (Space-to-Earth) Mobile 374	3700 - 4200 FIXED FIXED-SATELLITE (Space-to-Earth) MOBILE 379	

REASON: Continued and expanding use of fixed and mobile services and satellite Space-to-Earth links. Required for planned use for low-cost short-range radionavigation terminal radars (ASR) (satellite airports).

95.

MHz

Region 1	Region 2	Region 3
4200 - 4400	AERONAUTICAL RADIONAVIGATION ~~352A~~ 379A 379B 381 382 383	
ADD 379B:	The use of the band 4200 - 4400 MHz by the aeronautical radionavigati service is limited to airborne radio altimeters on an exclusive basis.	
REASON:	To limit the band 4200 - 4400 MHz to use by airborne radio altimeters	
4400 - 4700	FIXED FIXED-SATELLITE (Earth-to-Space) MOBILE	
4700 - ~~4990~~ 4950	FIXED MOBILE MOD 233B 354 382A ~~382B~~	
4950 - 4990	EARTH EXPLORATION SATELLITE (Passive) FIXED MOBILE RADIO ASTRONOMY SPACE RESEARCH (Passive) MOD 233B 354 ~~382A~~ 382B 382C	
4990 - 5000 ~~FIXED~~ ~~MOBILE~~ RADIO ASTRONOMY SPACE RESEARCH (Passive) EARTH EXPLORATION SATELLITE (Passive) MOD233B	4990 - 5000 RADIO ASTRONOMY SPACE RESEARCH (Passive) EARTH EXPLORATION SATELLITE (Passive) 383A	4990 - 5000 ~~FIXED~~ ~~MOBILE~~ RADIO ASTRONOMY SPACE RESEARCH (Passive) EARTH EXPLORATION SATELLITE (Passive) MOD233B

96.

ADD 382C Sharing criteria among those services operating in the band 4950-4990 MHz shall be up to the discretion of the administrations concerned.

Reason: Expansion of the band 4990-5000 MHz also provides access to 4950-4990 MHz which is necessary to support Radio Astronomy continuum observatio- If given status in the Table RRs 233B and 382B are no longer required.

97.

MHz	
5000 - 5250	AERONAUTICAL RADIONAVIGATION MOD 352A 352B 383B

REASON: Continued use for microwave landing system and distance measuring equipment.

Region 1	Region 2	Region 3
5250 - 5255	RADIOLOCATION Space Research 384 346A	
5255 - 5350	RADIOLOCATION 384 384A 346A	
5350 - 5460	AERONAUTICAL RADIONAVIGATION 385 Radiolocation	
5460 - 5470	RADIONAVIGATION 385 Radiolocation	

REASON: This part of spectrum is required for continued use of radiolocation, space research, radionavigation and aeronautical radionavigation services.

98.

MHz

Region 1	Region 2	Region 3
5470 - 5650	MARITIME RADIONAVIGATION Radiolocation 386 387	
5650 - 5670	RADIOLOCATION Amateur-Satellite Amateur 388 389	
5670 - 5725	Amateur Space Research (Deep Space) RADIOLOCATION 388 389 389A	
5725 - 5850 FIXED SATELLITE (Earth-to-Space) RADIOLOCATION Amateur 354 388 390 391 391A 357A	5725 - 5850 Amateur RADIOLOCATION 389 391 391A 357A	

NOC 391

REASON: Continuing need for ISM.

99.

MHz

Region 1	Region 2	Region 3
5850 - 5925 FIXED FIXED SATELLITE (Earth-to-Space) MOBILE 391	5850 - 5925 Amateur RADIOLOCATION 391	5850 - 5925 FIXED FIXED SATELLITE (Earth-to-Space) MOBILE Radiolocation 391

5925 - 6425	FIXED FIXED-SATELLITE (Earth-to-Space) MOBILE

REASON: Continued use of fixed, mobile and fixed satellite services.

6425 - ~~7250~~ 6925	FIXED MOBILE FIXED SATELLITE (Earth-to-Space) 379A ~~392AA~~ ~~392B~~ 393

100.

MHz

Region 1	* *	Region 2	* *	Region 3
6925-7250		FIXED MOBILE 379A		392B 393 MOD 392AA

MOD 392AA In Brazil, Canada and the United States of America, the band 6625 6925 - 7125 MHz is also allocated on a secondary basis, to the fixed-satellite service for space-to-Earth transmissions. In Region 2, the power flux density produced by space stations in this band shall be in accordance with the provisions of No. 470NM. In Regions 1 and 3, it shall be at least 6 dB lower. Receiving earth stations in this band may not impose restrictions on the locations or technical parameters of existing or future terrestrial stations of other countries.

Reason: Consequential to allocation change.

7250-7300		FIXED-SATELLITE (Space-to-Earth) 392D 392G		
7300-7450		FIXED FIXED-SATELLITE (Space-to-Earth) MOBILE 392D		
7450-7550		FIXED FIXED-SATELLITE (Space-to-Earth) METEOROLOGICAL-SATELLITE (Space-to-Earth) MOBILE 392D		
7550-7750		FIXED FIXED-SATELLITE (Space-to-Earth) MOBILE 392D		

101.

MHz

Region 1	*	Region 2	*	Region 3
	*		*	
7750-7900				
		FIXED		
		MOBILE		

102.

MHz

Region 1	Region 2	Region 3
7900 - 7975	FIXED FIXED-SATELLITE (Earth-to-Space) MOBILE	
7975 - 8025	FIXED-SATELLITE (Earth-to-Space) 392H	
8025 - 8175 FIXED FIXED-SATELLITE (Earth-to-Space) MOBILE Earth Exploration-Satellite (Space-to-Earth) 394B	8025 - 8175 EARTH EXPLORATION-SATELLITE (Space-to-Earth) FIXED FIXED-SATELLITE (Earth-to-Space) MOBILE	8025 - 8175 FIXED FIXED-SATELLITE (Earth-to-Space) MOBILE Earth Exploration-Satellite (Space-to-Earth)
8175 - 8215 FIXED FIXED-SATELLITE (Earth-to-Space) METEOROLOGICAL-SATELLITE (Earth-to-Space) MOBILE Earth Exploration-Satellite (Space-to-Earth) 394B	8175 - 8215 EARTH EXPLORATION-SATELLITE (Space-to-Earth) FIXED FIXED-SATELLITE (Earth-to-Space) METEOROLOGICAL-SATELLITE (Earth-to-Space) MOBILE	8175 - 8215 FIXED FIXED-SATELLITE (Earth-to-Space) METEOROLOGICAL-SATELLITE (Earth-to-Space) MOBILE Earth Exploration-Satellite (Space-to-Earth)

103.

MHz

Region 1	Region 2	Region 3
8215 - 8400 FIXED FIXED-SATELLITE (Earth-to-Space) MOBILE Earth Exploration-Satellite (Space-to-Earth) 394 394B	8215 - 8400 EARTH EXPLORATION-SATELLITE (Space-to-Earth) FIXED FIXED-SATELLITE (Earth-to-Space) MOBILE	8215 - 8400 FIXED FIXED-SATELLITE (Earth-to-Space) MOBILE Earth Exploration Satellite (Space-to-Earth) 394

REASON: Continued need for existing service.

8400 - 8500	FIXED MOBILE except aeronautical mobile (R) SPACE RESEARCH (Space-to-Earth) (deep space only) Land Mobile Satellite (Earth-to-Space) 394A 394D
8500 - 8750	RADIOLOCATION 354 395
8750 - 8850	RADIOLOCATION AERONAUTICAL RADIONAVIGATION 396 397

REASON: Continuing need for existing service.

8850 - 9000	RADIOLOCATION 397 398
9000 - 9200	AERONAUTICAL RADIONAVIGATION MOD 346 Radiolocation 397

104.

MHz

Region 1	Region 2	Region 3
9200 - 9300	RADIOLOCATION 397 398	
REASON: Continuing need for existing services.		
9300 - 9500	RADIONAVIGATION 367A 367B Radiolocation 399	
9500 - 9800	RADIOLOCATION 398 346A	
9800 - 10000	RADIOLOCATION Fixed 400 401 401A	
10000 - 10500	RADIOLOCATION Amateur 401A 402 403	

105.

GHz

Region 1	Region 2	Region 3
10.5 - 10.55 FIXED MOBILE Radiolocation	10.5 - 10.55 RADIOLOCATION 404	

REASON: Continued need for existing services.

NOC 404

REASON: Preserve system compatibility.

10.55 - 10.6	FIXED MOBILE Radiolocation
10.6 - 10.68	FIXED MOBILE except aeronautical mobile RADIO ASTRONOMY Radiolocation 404A 404B
10.68 - 10.7	FIXED MOBILE except aeronautical mobile RADIO ASTRONOMY 405B 404B

ADD 404B All airborne emissions are excluded.

REASON: Radio astronomy can share the 10.6 - 10.7 continuum band as long as airborne transmissions are excluded from the mobile and radiolocation services. The bands above are otherwise needed for continued and expanding use of the fixed, mobile and radiolocation services.

10.7 - 10.95	~~MOBILE~~ FIXED FIXED SATELLITE (Space-to-Earth)

REASON: This frequency band is currently in considerable use in the radio-relay service in the United States. The fixed-satellite allocation is needed on a world-wide basis.

106.

GHz

Region 1	Region 2	Region 3
10.95 - 11.2 FIXED MOBILE FIXED-SATELLITE (Space-to-Earth) ~~(Earth-to-Space)~~	10.95 - 11.2 ~~FIXED~~ ~~MOBILE~~ FIXED-SATELLITE (Space-to-Earth)	

REASON: Unidirectionality needed for compatibility.

11.2 - 11.45	FIXED ~~MOBILE~~ FIXED-SATELLITE (Space-to-Earth)

REASON: This frequency band is currently in considerable use in the radio-relay service in the United States. The fixed-satellite allocation is needed on a world-wide basis.

11.45 - 11.7	FIXED ~~MOBILE~~ FIXED-SATELLITE (Space-to-Earth)

REASON: Mobile allocation not needed.

11.7 - 12.5	11.7 - 12.2	11.7 - 12.2
FIXED MOBILE except aeronautical mobile BROADCASTING BROADCASTING-SATELLITE 405BA	~~FIXED~~ Mobile ~~MOBILE~~ except aeronautical mobile ~~BROADCASTING~~ BROADCASTING-SATELLITE FIXED-SATELLITE (Space-to-Earth) ~~405BB~~ 405BC	FIXED MOBILE except aeronautical mobile BROADCASTING BROADCASTING-SATELLITE 405BA

107.

GHz

Region 1	Region 2	Region 3

REASON: Satellite communications are envisaged to large numbers of inexpensive earth stations widely dispersed throughout the United States. TV mobile pick-up service is currently provided in this band on a secondary basis.

SUP 405BB

REASON: To enhance versatility in use of this band.

	12.2 - 12.5 FIXED MOBILE except aeronautical mobile BROADCASTING	
12.5 - 12.75 FIXED-SATELLITE ~~(Space-to-Earth)~~ (Earth-to-Space) 405BD 405BE	12.5 - 12.75 FIXED FIXED-SATELLITE (Earth-to-Space) MOBILE except aeronautical mobile	12.5 - 12.75 FIXED FIXED-SATELLITE ~~(Space-to-Earth)~~ (Earth-to-Space) MOBILE except aeronautical mobile

REASON: Unidirectionality needed for compatibility.

12.75 - 13.25	FIXED-SATELLITE (Earth-to-Space) FIXED MOBILE SPACE RESEARCH (deep space only) (Space-to-Earth)

REASON: Continuing need for existing services. The Fixed-Satellite Service is needed on a worldwide basis. Space research for reception at selective sites.

13.25 - 13.4	AERONAUTICAL RADIONAVIGATION 406 407 MOD407A

REASON: Required for airborne doppler radar.

108.

GHz

Region 1	Region 2	Region 3
13.4 - 14	EARTH EXPLORATION SATELLITE (ACTIVE SENSORS) RADIOLOCATION 407 MOD 407A 408 409	
14 - 14.3	Space Research (Earth-to-Space) FIXED SATELLITE (Earth-to-Space) RADIONAVIGATION 408A 407 ~~407A~~ [illegible]	

REASON: This frequency band is currently used for marine radar. This frequency band will be used for long-haul and international voice and data channel communications. The band 13.4-14 is required for radiolocation type active sensors.

14.3 - 14.4	FIXED-SATELLITE (Earth-to-Space) ~~RADIONAVIGATION-SATELLITE~~ ~~408A~~	
14.4 - 14.5	Space Research (Earth-to-Space) MOBILE FIXED FIXED-SATELLITE (Earth-to-Space) 408B, MOD 408C	

MOD 407A The band 13.25-14.0 ~~14.2~~ GHz may also be used, on a secondary basis, for Earth-to-Space transmission in the space research service, subject to agreement between the administrations concerned and those having services operating in accordance with the Table, which may be affected.

Reason: Consequential to allocation change.

Reason: These bands will be used for the domestic and international voice and data channel communications. The bands 14-14.3 and 14.4-14.5 will be used for space research.

MOD 408C Radio astronomy observations on the formadlehyde line (rest frequency 14489 GHz) are being carried out in a number of countries under national arrangements. In making assignments to ~~stations in the fixed and mobile~~ other services, administrations are urged to take all practicable steps to protect radio astronomy observations from harmful interference, particularly from airborne or spaceborne transmitters, in the band ~~14.485 14.515~~ 14.473-14.503 GHz.

109.

MOD 408B The band 14.4 14.5-15.35 GHz may also be used, on a secondary basis, for space-to-Earth transmissions in the space research service, subject to agreement between the administrations concerned and those having services, operating in accordance with the Table, which may be affected.

Reason: Consequential to allocation change.

110.

GHz

Region 1	Region 2	Region 3
14.5 - 15.35	FIXED MOBILE MOD 408B MOD 408C	
15.35 - 15.4	EARTH EXPLORATION SATELLITE (PASSIVE) SPACE RESEARCH (PASSIVE) RADIO ASTRONOMY 409C	
15.4 - 15.7	AERONAUTICAL RADIONAVIGATION MOD 352A MOD 352B 407	

REASON: Other passive services can share the band 15.35- 15.40 GHz. The band 15.4-15.7 GHz is required for continued and expanded use for microwave landing system (MLS) and airborne weather radar.

15.7 - 16.6	RADIOLOCATION 407 408 409CA	

REASON: The frequency band is required for radiolocation

16.6 - 17.1	SPACE RESEARCH (DEEP SPACE ONLY) (EARTH-TO-SPACE) RADIOLOCATION 407 408	

ADD 409CA In the radiolocation band 15.7-16.6 GHz, the portion 15.7-16.2 GHz may be used also for Airport Surface Detection Equipment (ASDE).

111.

GHz

Region 1	Region 2	Region 3
17.1 - 17.35	RADIOLOCATION 407 408	
17.35 - 17.7	EARTH EXPLORATION SATELLITE (ACTIVE SENSORS) SPACE RESEARCH (ACTIVE SENSORS) RADIOLOCATION 407 408	

REASON: Space services listed appear to be compatible with existing services

17.7 -17.9	FIXED FIXED-SATELLITE (Space-to-Earth) MOBILE	
17.9-18.7	EARTH EXPLORATION SATELLITE (Space-to-Earth) FIXED-SATELLITE (Space-to-Earth) FIXED MOBILE	
18.7 - 19.7	FIXED FIXED-SATELLITE (Space-to-Earth) MOBILE	

Reason: Required for read out of telemetry from E.E.S.

112.

GHz

Region 1	* *	Region 2	* *	Region 3
19.7 - ~~21.2~~ 20.2		FIXED-SATELLITE (Space-to-Earth)		
		409E		
20.2 - 21.2		FIXED-SATELLITE (Space-to-Earth) MOBILE-SATELLITE (Space-to-Earth)		
		409E		

Reason: Required for Mobile-Satellite sharing.

113.

GHz

Region 1	Region 2	Region 3
21.2 - 22	FIXED MOBILE ~~EARTH-EXPLORATION-SATELLITE (Space-to-Earth)~~	

REASON: This band will be used for terrestrial radio relay and for land mobile experimental, developmental and research uses.

22 - ~~22.5~~ 22.21	FIXED MOBILE ~~410A~~	

REASON: This frequency band will be used for terrestrial radio relay and for land mobile experimental, developmental and research uses.

22.21 - 22.5	FIXED MOBILE EARTH EXPLORATION SATELLITE (Passive) SPACE RESEARCH (Passive) RADIO ASTRONOMY 410A	

REASON: This frequency band will be used for radio astronomy observations of the water vapor line (rest frequency 22.235 GHz) and for terrestrial radio relay service and for land mobile experimental, developmental and research uses.

SUP 410A

REASON: Consequential to allocation changes.

114.

GHz

Region 1	Region 2	Region 3
22.5 -23.0 22.7 FIXED MOBILE		22.5 - 23.0 22.7 FIXED MOBILE BROADCASTING-SATELLITE 410 B

REASON: This frequency band will be used for terrestrial radio relay systems and for land mobile experimental, devebpmental and research uses.

115.

GHz

Region 1	Region 2	Region 3
22.7 23		22.7-23
FIXED MOBILE INTERSATELLITE		FIXED MOBILE INTERSATELLITE BROADCASTING SATELLITE
ADD 410D		410B ADD 410D

Reason: This frequency band will be used for communications between satellites.
SUP 410B Reason: Consequential to allocation change.

ADD 410D The bands 22.81-22.86 GHz, 23.07-23.12 GHz and 24.11 to 24.16 GHz also allocated to the Radio Astronomy service for observations of spectral lines due to Ammonia (rest frequencies 22.834, 23.098 and 24.139 GHz).

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23 - 23.6

FIXED
MOBILE
410D

Reason: This frequency band will be used for terrestrial microwave and operational fixed users.

23.6-24

EARTH EXPLORATION SATELLITE (PASSIVE)
SPACE RESEARCH (PASSIVE)
RADIO ASTRONOMY
MOD 407

Reason: This is a very important continuum band that also covers the important ammonia (NH_3) lines. Passive space services can share.

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24 -24.05

AMATEUR
AMATEUR-SATELLITE
410 C 410 D

Reason: To promote national and international exchange of thoughts and ideas.

116.

GHz

Region 1	Region 2	Region 3
24.05 - 24.25	RADIOLOCATION Amateur 410C 407 410D	
REASON: To promote exchange of thoughts and ideas.		
24.25 - 25.25	RADIONAVIGATION 411 412	
REASON: Required for existing radionavigation.		
25.25 - 27.5	FIXED MOBILE	
27.5 - 29.5	FIXED FIXED-SATELLITE (Earth-to-Space) MOBILE	
REASON: To provide an uplink band to pair with the band around 20 GHz. This frequency band will be used for the terrestrial radio relay system.		
29.5 - 30	FIXED-SATELLITE (Earth-to-Space) 409E	
30 - 31	FIXED-SATELLITE (Earth-to-Space) MOBILE - SATELLITE 409E	

117.

GHz

Region 1	Region 2	Region 3
31 - 31.3	FIXED MOBILE Space Research 412H 412I	
31.3 -31.5	SPACE RESEARCH (PASSIVE SENSOR) EARTH EXPLORATION SATELLITE (PASSIVE SENSOR) RADIO ASTRONOMY 412A	
31.5 - 31.8 SPACE RESEARCH (PASSIVE) Fixed Mobile except aeronautical mobile RADIO ASTRONOMY EARTH EXPLORATION SATELLITE (PASSIVE)	31.5 - 31.8 SPACE RESEARCH (PASSIVE) RADIO ASTRONOMY EARTH EXPLORATION SATELLITE (PASSIVE) 405C	31.5 - 31.8 SPACE RESEARCH (PASSIVE) Fixed Mobile except aeronautical mobile RADIO ASTRONOMY EARTH EXPLORATION SATELLITE (PASSIVE)

REASON: The frequency region 31.3-31.8 GHz is the first atmospheric window in the millimeter radio regions where observations can be made. This spectral region has been very useful in defining the high frequency continuum spectra of galactic and extragalactic objects. Passive services can share with Radio Astronomy.

31.8 - 32.3	RADIONAVIGATION Space Research 412B
32.3 - 33	RADIONAVIGATION
33 - 33.4 RADIO ASTRONOMY RADIONAVIGATION	33 - 33.4 RADIONAVIGATION 412F

REASON: Required for sweep radar for small aircraft.

33.4 - 34.2	RADIOLOCATION 407 408 412 412G

GHz 118.

Region 1	Region 2	Region 3
34.2 - 35.2	RADIOLOCATION ~~Space Research~~ SPACE RESEARCH (ACTIVE SENSORS) METEOROLOGICAL AIDS EARTH EXPLORATION SATELLITE (ACTIVE SENSORS) 407 408 412 412C 412D	
REASON: Required for radiolocation type sensors and meteorological aids radar.		
35.2 - 36	RADIOLOCATION 407 408 412	
36 - ~~40~~ -37	~~FIXED~~ ~~MOBILE~~ SPACE RESEARCH (PASSIVE) EARTH EXPLORATION SATELLITE (PASSIVE) FIXED-SATELLITE MOBILE-SATELLITE 391A 412E	
37 - 40	FIXED MOBILE 391A 412E	
REASON: This band will be shared between the common carrier and the operational fixed for block allocation use, and for land mobile experimental, developmental and research use.		
40 - 41	FIXED-SATELLITE ~~(Space-to-earth)~~ FIXED MOBILE MOBILE-SATELLITE	
REASON: This band will be use for terrestrial systems and shared with the mobile- and fixed-satellite services.		
41 - 43	BROADCASTING-SATELLITE FIXED MOBILE ADD 412L	

119.

Reason: This frequency band will be used for terrestrial system.

ADD 412L Radio astronomy observations on the silicon monoxide lines are carried on in a number of countries under national arrangements. In making assignments , administrations are urged to protect radio astronomy observations from harmful interference, particularly from airborne or spaceborne transmitters, in the 42.77 - 42.87, 43.07-43.17, and 43.37 - 43.47 GHz bands.

120.

GHz

Region 1	* *	Region 2	* *	Region 3
43- 48 - 45		AERONAUTICAL-MOBILE-SATELLITE MARITIME MOBILE SATELLITE AERONAUTICAL RADIONAVIGATION SATELLITE MARITIME-RADIONAVIGATION SATELLITE FIXED-SATELLITE MOBILE-SATELLITE 412L		

Reason: To satisfy requirements of the Federal Government.

45-48		AERONAUTICAL MOBILE (R) AERONAUTICAL MOBILE-SATELLITE (R) MARITIME MOBILE MARITIME MOBILE-SATELLITE AERONAUTICAL RADIONAVIGATION AERONAUTICAL RADIONAVIGATION-SATELLITE MARITIME RADIONAVIGATION MARITIME RADIONAVIGATION-SATELLITE		

Reason: This frequency band will be used for communicating to ships and aircraft for position determination and surveillance.

48-50		AERONAUTICAL MOBILE (R) AERONAUTICAL MOBILE-SATELLITE (R) MARITIME MOBILE MARITIME MOBILE-SATELLITE AERONAUTICAL RADIONAVIGATION AERONAUTICAL RADIONAVIGATION-SATELLITE MARITIME RADIONAVIGATION MARITIME RADIONAVIGATION-SATELLITE		

50- 51 - 50.4		FIXED FIXED-SATELLITE (Earth-to-Space) MOBILE		

Reason: This frequency band will be used by the terrestrial systems.

121.

GHz

Region 1	* *	Region 2	* *	Region 3
50.4 - 51		FIXED-SATELLITE (Earth-to-Space) FIXED MOBILE MOBILE-SATELLITE		
51 - 52-51.4		EARTH-EXPLORATION-SATELLITE SPACE RESEARCH FIXED MOBILE FIXED-SATELLITE MOBILE-SATELLITE		

Reason: Required to satisfy multiple services which may interfere.

51.4-52		EARTH EXPLORATION-SATELLITE (Passive) SPACE RESEARCH (Passive)		

Reason: This frequency band will continue to be used to explore the resources of the Earth by satellite techniques.

52-54.25		EARTH EXPLORATION-SATELLITE (Passive) SPACE RESEARCH (Passive) MOD 412J		

Reason: This frequency band will continue to be used in conducting research work in space.

MOD 412J All emissions in the bands 52-54.25 GHz, 58.2-59 GHz, 64-65 GHz, 86-92 GHz, 101-102 GHz, 105-116 GHz, 130-140 GHz, 182-185 GHz, and 230-240 GHz, are prohibited. The use of passive sensors by other services is also authorized.

122.

GHz

Region 1	Region 2	Region 3
54.25 - 58.2	SPACE RESEARCH (Passive) FIXED MOBILE INTER-SATELLITE EARTH EXPLORATION SATELLITE (Passive) ADD 410E	

REASON: This frequency band will be used for terrestrial systems, and space services as shown.

ADD 410E The frequency 55 GHz is designated for industrial, scientific and medical purposes. Emissions must be confined within the limits of ± 250 MHz of that frequency. Radiocommunication services operating within these limits must accept any harmful interference that may be experienced from the operation of industrial, scientific and medical equipment.

REASON: New applications; heating of small fibers and pellets; insect control; host of specific biological applications based on recent evidence of frequency specific effects.

58.2 - 59	EARTH EXPLORATION SATELLITE (Passive) SPACE RESEARCH (passive) MOD 412J	

REASON: This frequency band will continue to be used for conducting research in space.

59 - 64	FIXED MOBILE INTER-SATELLITE	

REASON: This frequency band will be used for terrestrial service.

64 - 65	SPACE RESEARCH (Passive) EARTH EXPLORATION SATELLITE (Passive) MOD 412J	

123.

GHz

Region 1	Region 2	Region 3

REASON: This frequency band will be used for conducting passive research in space.

65 - 66

EARTH EXPLORATION-SATELLITE
SPACE RESEARCH

REASON: This frequency band will be used for exploring the resources of the earth by satellite techniques.

66 - 71

AERONAUTICAL MOBILE (R)
AERONAUTICAL MOBILE-SATELLITE (R)
MARITIME MOBILE
MARITIME MOBILE-SATELLITE
AERONAUTICAL RADIONAVIGATION
AERONAUTICAL RADIONAVIGATION-SATELLITE
MARITIME RADIONAVIGATION
MARITIME RADIONAVIGATION-SATELLITE

REASON: This frequency band will be used for maritime and aeronautical mobile services.

71- 84 - 72

EARTH EXPLORATION SATELLITE (Active Sensors)
SPACE RESEARCH (Active Sensors)
RADIOLOCATION
Amateur
Amateur-Satellite

Reason: Band required for services specified.

72-76

RADIOLOCATION
Amateur
Amateur-Satellite
ADD 412M

Reason: This frequency band will be used for amateur services to promote national and international exchange of thoughts and ideas.

124.

ADD 412M Radio-astronomy observations on the H_2CO lines are being carried out by a number of countries under national arrangements. In making assignments administrations are urged to protect radio-astronomy observations from harmful interference at 72.409 GHz, 145.603 GHz and 150.498 GHz.

125.

GHz

Region 1	* *	Region 2	* *	Region 3
76-80		FIXED-SATELLITE MOBILE-SATELLITE FIXED MOBILE		

Reason: This frequency band will be used for terrestrial and space systems.

80 - 84		FIXED MOBILE FIXED-SATELLITE		

Reason: This band will be used for terrestrial and Space services.

84-86		BROADCASTING-SATELLITE FIXED MOBILE		

Reason: This frequency band will be used for terrestrial services and for providing service to multi-destination low cost users.

86-92		EARTH EXPLORATION-SATELLITE (Passive) RADIO ASTRONOMY SPACE RESEARCH (Passive) MOD 412J		

Reason: This frequency band will be used for radio astronomy observations and for conducting passive research in space.

92-95		RADIOLOCATION FIXED-SATELLITE (Earth-to-Space) FIXED MOBILE ADD 412N		

Reason: The frequency band will be used for terrestrial services and transmission of voice, data, television signals by satellites. Also required for Radiolocation.

126.

ADD 412N Radio astronomy observations on the Dinitrogen Hydronium line are being carried out on a number of countries under national arrangements. In making assignments administrations are urged to protect radio astronomy observations in the band 93.12 to 93.22 GHz from harmful interference.

127.

GHz

Region 1	Region 2	Region 3
95 - 101	AERONAUTICAL MOBILE (R) AERONAUTICAL MOBILE-SATELLITE (R) MARITIME MOBILE MARITIME MOBILE-SATELLITE AERONAUTICAL RADIONAVIGATION AERONAUTICAL RADIONAVIGATION-SATELLITE MARITIME RADIONAVIGATION MARITIME RADIONAVIGATION-SATELLITE	

REASON: This frequency band will be used for ship and aircraft communications, position determination and air traffic control.

101 - 102	SPACE RESEARCH (Passive) MOD 412J	

REASON: This frequency band will be used for conducting passive research in space.

102 - 105	~~FIXED-SATELLITE (Space-to-Earth)~~ FIXED MOBILE MOBILE-SATELLITE	

REASON: This frequency band will be used for terrestrial services and for transmission of voice, data, television signals by satellite. Also to be shared with Mobile Satellite.

105 - ~~130~~ 116	EARTH EXPLORATION-SATELLITE (Passive) ~~INTERSATELLITE~~ RADIO ASTRONOMY SPACE RESEARCH (Passive) MOD 412J ~~412K~~	

REASON: This frequency band will be used for radio astronomy observations of the carbon monoxide lines and for conducting passive research in space.

128.

GHz

Region 1	Region 2	Region 3
116 - 130	INTER-SATELLITE FIXED MOBILE ~~412K~~ 410F	

REASON: This frequency band will be used for communications between satellites and for terrestrial radio relay service.

SUP ~~412K~~

REASON: Consequential to reallocation.

ADD 410F The frequency 120 GHz is designated for industrial, scientific and medical purposes. Emissions must be confined within the limits of ± 500 MHz of that frequency. Radiocommunication services operating within these limits must accept any harmful interference that may be experienced from the operation of industrial, scientific and medical equipment.

REASON: New applications; heating of small fibers and pellets; insect control; host of specific biological applications based on recent evidence of frequency specific effects.

130 - 140	INTER-SATELLITE FIXED MOBILE ~~RADIO-ASTRONOMY~~ ~~SPACE-RESEARCH-(passive)~~ ~~412J~~	

REASON: This frequency band will be used for communications between satellites and for terrestrial services.

140 - 142	FIXED-SATELLITE (~~Earth-to-Space~~) FIXED MOBILE ADD 412M	

REASON: This frequency band will be used for terrestrial services and for transmission of voice, data and television signals by satellite.

129.

GHz

Region 1	Region 2	Region 3
142 - 150	Radiolocation AERONAUTICAL MOBILE (R) AERONAUTICAL MOBILE-SATELLITE (R) MARITIME MOBILE MARITIME MOBILE-SATELLITE AERONAUTICAL RADIONAVIGATION AERONAUTICAL RADIONAVIGATION-SATELLITE MARITIME RADIONAVIGATION MARITIME RADIONAVIGATION-SATELLITE ADD 4120 ADD 412M	

REASON: This frequency band will be used for ship, aircraft communications, position determination and for air traffic control.

ADD 4120 Radio astronomy observations on the denterated cyanide line is being carried out on a number of countries under national arrangements. In making assignments to stations in the mobile services, administrations are urged to protect radio astronomy observations from harmful interference between 144.68 and 144.98 GHz band.

150 - 151	FIXED-SATELLITE (Space-to-Earth) FIXED MOBILE ADD 412M	

REASON: This frequency band will be used for terrestrial services and for communication of voice, data, television signals by satellites.

151-152	FIXED-SATELLITE (Space-to-Earth) MOBILE-SATELLITE FIXED MOBILE	
152-170 159	FIXED-SATELLITE MOBILE-SATELLITE FIXED MOBILE	

130.

GHz

Region 1	* *	Region 2	* *	Region 3
159-165		FIXED MOBILE FIXED-SATELLITE		

Reason: This frequency band will be used for terrestrial and space services.

165-170		RADIOLOCATION Amateur Amateur-Satellite		

Reason: This frequency band will be used for determining position of objects and for amateurs to promote national and international exchange of thoughts and ideas.

131.

GHz

Region 1	* *	Region 2	* *	Region 3
170-~~182~~ 174.5		FIXED MOBILE except aeronautical mobile INTER-SATELLITE		

Reason: This frequency band will be used for terrestrial services.

174.5 - 176.5		~~INTERSATELLITE~~ EARTH EXPLORATION SATELLITE (Passive) SPACE RESEARCH (Passive) FIXED MOBILE (except Aeronautical Mobile) ADD 412P		

Reason: This band required for both terrestrial and space services as shown.

ADD 412P Radio astronomy observations on the C_2H line, HCN line, the HCO+ line, the HNC line and N_2H^+ line are being carried out on a number of countries under national arrangements. In making assignments administrations are urged to protect radio astronomy observations from harmful interference at 174.6-174.85 GHz, 177.2 GHz, 178.4 GHz, 181.2 GHz and 186.4 GHz.

176.5 - 182		FIXED MOBILE except aeronautical mobile INTER-SATELLITE ADD 412P		

Reason: This frequency band will be used for terrestrial services and for communications between satellites.

132.

GHz

Region 1	* *	Region 2	* *	Region 3
182 - 185		EARTH EXPLORATION SATELLITE (Passive) SPACE RESEARCH (Passive) RADIO ASTRONOMY MOD 412J		

Reason: This frequency band will be used for radio astronomy observations of water vapor line and for conducting passive research in space.

185- 190		FIXED INTER-SATELLITE MOBILE ADD 412P		

Reason: This frequency band will be used for terrestrial services and for communications between satellites.

133.

GHz

Region 1	Region 2	Region 3
190 - 200 195	AERONAUTICAL MOBILE (R) AERONAUTICAL MOBILE-SATELLITE (R) ~~MARITIME MOBILE-SATELLITE~~ AERONAUTICAL RADIONAVIGATION AERONAUTICAL RADIONAVIGATION-SATELLITE ~~MARITIME RADIONAVIGATION-SATELLITE~~	

REASON: This frequency band will be used for ... aircraft communications and position determination and for air traffic control.

195-200	~~AERONAUTICAL MOBILE-SATELLITE~~ MARITIME MOBILE-SATELLITE ~~AERONAUTICAL-RADIONAVIGATION-SATELLITE~~ MARITIME RADIONAVIGATION-SATELLITE MARITIME MOBILE MARITIME RADIONAVIGATION	

Reason: This frequency band will be used for ship communications and position determination and for air traffic control.

200- 220 201.5	FIXED MOBILE	

Reason: This frequency will be used for terrestrial services.

134.

GHz				
Region 1	* *	Region 2	* *	Region 3
201.5-213		FIXED-SATELLITE MOBILE-SATELLITE FIXED MOBILE		
213-217		FIXED-SATELLITE FIXED MOBILE		
217-220		FIXED MOBILE RADIO ASTRONOMY MOD 412J		

Reason: This frequency band will be used for terrestrial services and for radio astronomy observations.

220-230 221		~~FIXED-SATELLITE~~ FIXED MOBILE RADIO ASTRONOMY MOD 412J		

Reason: This frequency band will be used for communications of voice, data and television signals by satellite and for terrestrial systems and for radio astronomy observations.

135.

GHz

Region 1	Region 2	Region 3
221 - 229	FIXED-SATELLITE FIXED MOBILE	

REASON: This frequency band will be used for communications of voice, data and television signals by satellite and for terrestrial systems.

229 - 230	~~FIXED-SATELLITE~~ FIXED MOBILE RADIO ASTRONOMY	

REASON: This frequency band will be used for communications of voice, data, and television signals by satellite, for terrestrial systems and for radio astronomy observations.

230 - 240	EARTH EXPLORATION SATELLITE (Passive) RADIO ASTRONOMY SPACE RESEARCH (Passive) MOD 412J	

REASON: This frequency band will be used for radio astronomy observations and for conducting passive research in space.

240-250	RADIOLOCATION FIXED MOBILE Amateur Amateur-Satellite ADD 410G	

136.

GHz

Region 1	Region 2	Region 3

REASON: This frequency will be used to determine the location of objects and for the amateur service to promote national and international exchange of thoughts and ideas.

ADD 410G The frequency 248 GHz is designated for industrial, scientific and medical purposes. Emissions must be confined within the limits of ± 500 MHz of that frequency. Radiocommunication services operating within these limits must accept any harmful interference that may be experienced from the operation of industrial, scientific and medical equipment.

REASON: New applications; heating of small fibers and pellets; insect control; host of specific biological applications based on recent evidence of frequency specific effects.

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250 - 265	AERONAUTICAL MOBILE (R) AERONAUTICAL MOBILE-SATELLITE (R) MARITIME MOBILE MARITIME MOBILE-SATELLITE AERONAUTICAL RADIONAVIGATION AERONAUTICAL RADIONAVIGATION-SATELLITE MARITIME RADIONAVIGATION MARITIME RADIONAVIGATION-SATELLITE ADD 412Q	

REASON: This frequency band will be used by ships and aircraft for communications, and for position determination and for air traffic control.

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265 - ~~275~~ 271	FIXED-SATELLITE FIXED MOBILE ADD 412Q	

REASON: This frequency band will be used by the terrestrial services and for communications of voice, data and television signals by satellites.

271-275	FIXED-SATELLITE MOBILE-SATELLITE FIXED MOBILE ADD 412Q	

137.

GHz		
Region 1	Region 2	Region 3
275 - 300 FIXED MOBILE ADD 412Q		

REASON: This frequency band will be used by terrestrial services.

ADD 412Q Radio astronomy observations on the C_2H, HCN, HCO+, HNC, and N_2H+ lines are being carried out in a number of countries under national arrangements. In making assignments administrations are urged to protect radio astronomy observations from harmful interference, particularly from airborne or spaceborne transmitters, in the frequencies 262.5 GHz, 265.9 GHz, 267.6 GHz, 272.0 GHz, and 279.5 GHz.

Above 300 GHZ not allocated.

APPENDIX 2

PROPOSED DRAFT PROTOCOL CONCERNING MEDICAL TRANSPORTS

DRAFT PROTOCOL I ANNEX

Regulations Concerning the Identification and Marking of Medical Personnel, Units and Means of Transport, and Civil Defence Personnel, Equipment and Means of Transport

Article 7—Radio signal

1. The radio signal shall consist of a radiotelephonic or radiotelegraphic message preceded by a distinctive priority signal to be designated and approved by a World Administrative Radio Conference of the International Telecommunication Union. It shall be transmitted three times before the call sign of the medical transport involved. This message shall be transmitted in English at appropriate intervals on a frequency or frequencies specified pursuant to paragraph 3. The use of the priority signal shall be restricted exclusively to medical units and transports.

2. The radio message preceded by the distinctive priority signal mentioned in paragraph 1 shall convey the following data:

(a) The call sign of the medical transport
(b) Position of the transport
(c) Number and type of medical transports
(d) Intended route
(e) Estimated time en route and of departure and arrival, as appropriate
(f) Any other information such as flight altitude, radio frequencies guarded, languages and secondary surveillance radar modes and codes.

3. In order to facilitate the communications referred to in paragraphs 1 and 2, as well as the communications referred to in articles (23 * * * 32 inclusive) of the Protocol, the High Contracting Parties, the Parties to a conflict, or one of the Parties to a conflict, acting in agreement or alone, may designate, in accordance with the Table of Frequency Allocations in the Radio Regulations annexed to the International Telecommunication Convention, and publish selected national frequencies to be used by them for such communications. These frequencies shall be notified to the International Telecommunication Union in accordance with procedures to be approved by a general World Administrative Radio Conference.

Article 8—Electronic identification

1. The secondary surveillance radar (SSR) system as specified in Annex 10 to the Chicago Convention on International Civil Aviation of 7 December 1944, as amended from time to time, may be used to identify and to follow the course of medical aircraft. The SSR mode and code to be reserved for the exclusive use of medical aircraft shall be established by the High Contracting Parties, the Parties to a conflict, or one of the Parties to a conflict, acting in agreement or alone, in accordance with procedures to be recommended by the International Civil Aviation Organization.

2. Parties to a conflict may, by special agreement between them, establish for their use a similar electronic system for the identification of medical vehicles, and medical ships and craft.

Article 9—Radio communications

In application of the procedures referred to in articles (23 * * * 32 inclusive) of the Protocol, appropriate radio communications by medical units and transports may be preceded by the priority signal referred to in article 7 of the present annex.

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